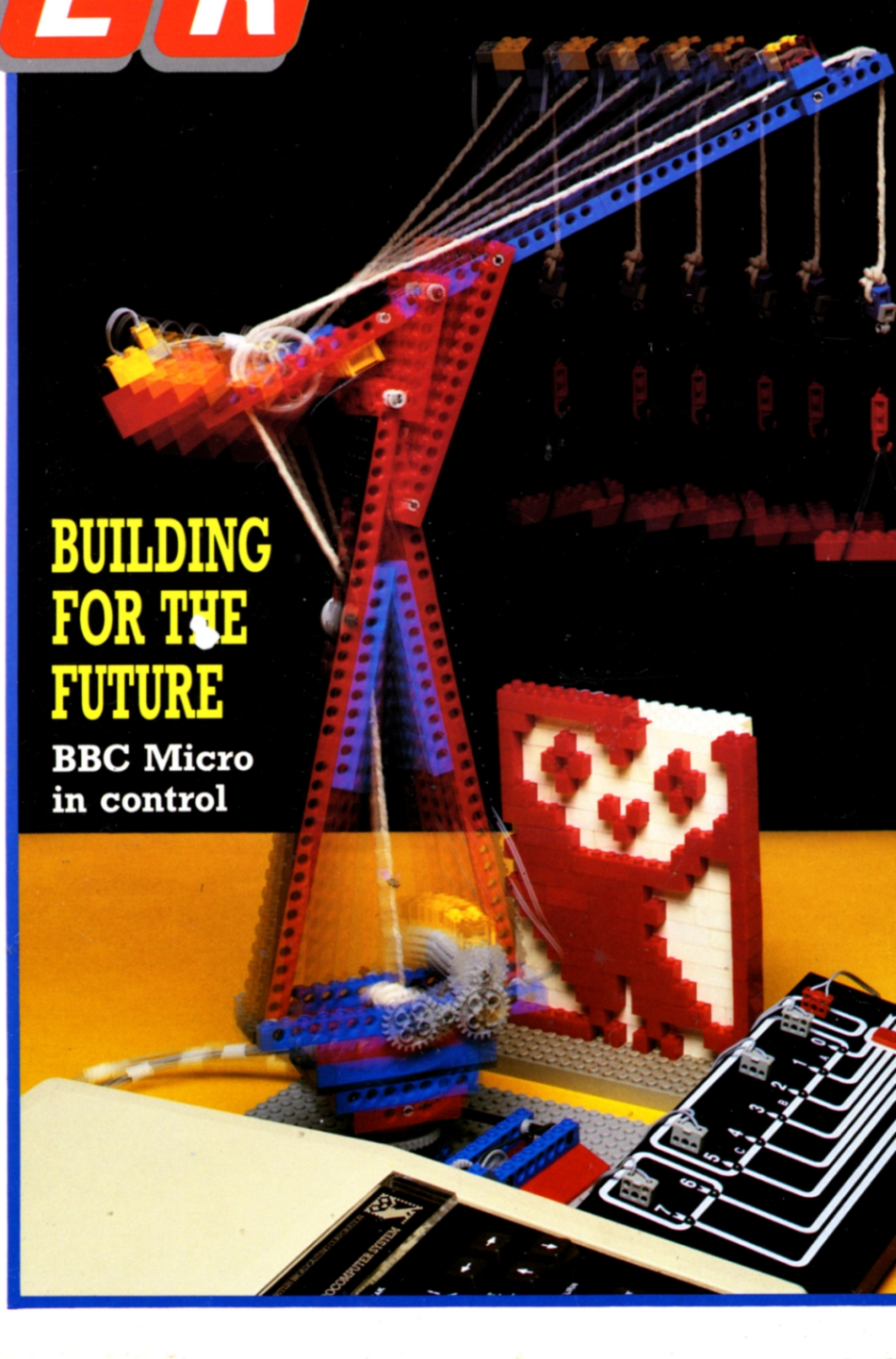
A Database Publication

THE MICRO USER

Volume 6
Number 8
October 1988
£1.50

Top-selling guide to the BBC Micro, Master, Archimedes and Z88



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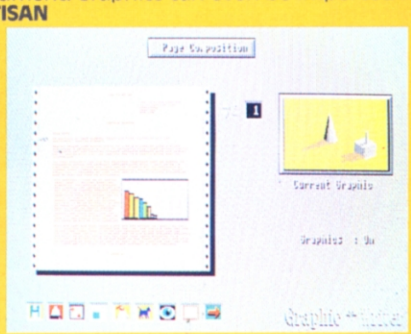

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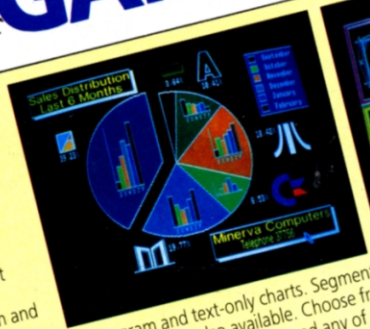
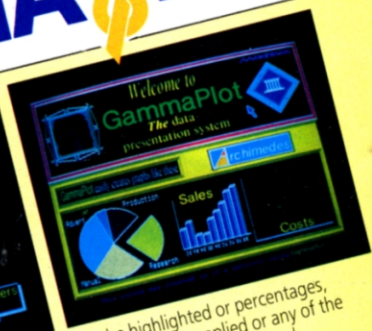
GAMMA PLOT

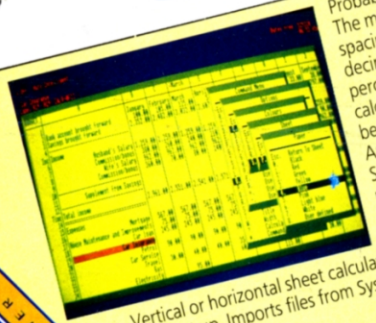




Seeing is believing! GammaPlot is an extensive chart/graph plotting program with a full art package included. It allows even a novice to produce stunning charts and drawings on one screen. Several charts may be placed on one sheet, in any position with text or drawings to make the data easily understood.

GammaPlot supports six main graph and chart types of line, scatter, pie, histogram, 3D histogram and text-only charts. Segments may be highlighted or percentages, values and labels switched on. Statistics are also available. Choose from the text styles supplied or any of the native Archimedes 'pretty fonts' or even define your own, and any of these can be enlarged or reduced. Various shapes, patterns and borders are supplied with a full 256 colour range. Full zoom facility. Various pen types are provided to draw pictures or add signatures. Import digitised pictures or company logos. Print facilities include colour output. Data entry is via the key board or any Delta, Gamma or Sigma file.

SIGMA SHEET



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The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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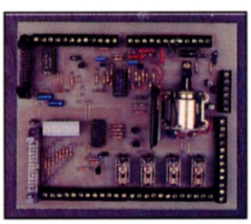

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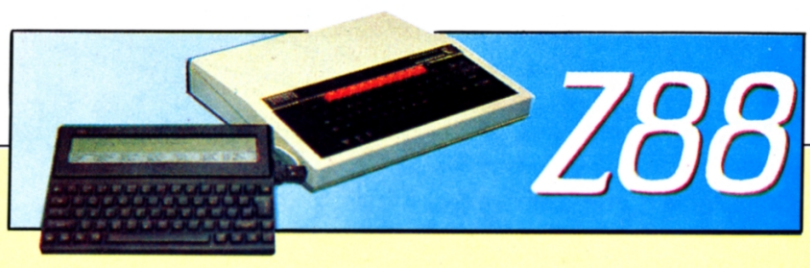

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Add the potential of Lego to Logo's power and you have the ultimate in educational resource packages to attract a wide range of ages.

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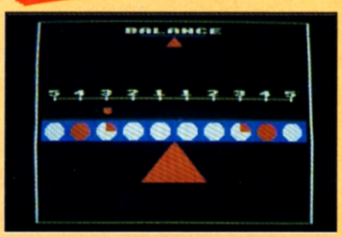
Fun and Games



Have educational fun as you learn the theory of moments in minutes.
– Page 41

Join in the arcade action in our fast action game of the month.
– Page 115

Now you can get . . .

THE MICRO USER

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That's the extra special offer we are making this month for all readers who take out a subscription to our monthly tape or disc.

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Details on Page 135

MICRO USER CLASSIFIEDS

The best bargains in the world of the BBC Micro come from fellow readers of *The Micro User*. Turn to **Page 112** to find just what you're looking for – from cheap modems to complete computer systems.

For full details on how the checksums work, see the Get-it-Right article on Page 28 of the February 1988 issue of *The Micro User*.

The Type-it-in symbol indicates that the feature contains at least one full length listing for you to key in on your micro.

NEXT MONTH

CONFUSION
Rubik's Clock solved
LOGOS
Personalised stationery
GAME
Bridg-It for BBC or Z88
FUTURES
Your own expert system

THE MICRO USER

November issue on sale October 5

BEEBUG

The Magazine For BBC/Master/Compact Users Is Now In Its 7th Year

This is just a small sample of the items featured in Volume 6

GENERAL FEATURES

ARM Wrestling
Archimedes (Acorn launch)
Overview of Computer Education
C Programming
Now C Here (Part 1)
Comms Problems
Intelligent Modems
Exploring Assembler
Introduction to Assembly Language
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Colouring your Beeb Pt.2
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Animation (Trench)
Giant Bounce
Giant Scroller

60 In Depth Editorial Features

PROGRAMS : Applications

Chart Recorder
Circuit Analysis
Ghost Host (Bulletin Board)
Keystrip Generator
Marks Analysis for Teachers
Personal Appointments Di
inting and Transposi
or Calculation
Video Cassette Cataloguer Pt.1
World by Night and Day

Over 60 Programs that you can type in (or load from disc/tape) ranging from a Full Screen Editor to a Bulletin Board.

REVIEWS : Books

Books for Serious Users
Master Operating Sys. (DABS Press)
The New Advanced User Guide (Adder)
Books for View
A Dabhand Guide (DABS Press)
Mastering View (Sigma Press)
Computing without Programming
The C Programming Language
The Recursive Universe

The latest News from Acorn and other major suppliers.

REVIEWS : Software

InterBase (Computer Concepts)
Master Emulation ROM (DABS Press)
PCB Autoroute (Pineapple Software)
PrintROM (Windmill Software)
Realtime Solids (Silicon Vision)
View Professional (Acorn Computers)
Word Power (Ian Copestake Software)
ADU ROM (Pineapple Software)
Acornsoft C (Acorn Computers)
Diagram II (Pineapple Software)
Fontaid (CJE Micros)
Genie (PMS)

PROGRAMS : Utilities

ADFS Menu for View
Animated Titling
DFS Utilities: *FREE and *MAP
Epson Character Definer
Function Keys
IBM to BBC Transfer Utility Pt.1
MIDAS Universal Disc Front End
Machine Code Cross Referencer
Mode 7 Menu Generator
Overlaying Techniques
Procedure and Function Analyser
RAM (Vectored Entry into)
ROM Controller (Improvements)
ROM Filing System Image Generato
Screen Dump for Mode 0

REVIEWS : Hardware

Music 400 (Hybrid Technology Ltd)
Pearl 8000 Data Logger (Innovations)
Quest Mouse (Watford Electronics)
Real Time Clock (Solidisk)
Z88 (Cambridge Computers)
Archimedes A440 (Acorn)
Co-Processor (Watford Electronics)
Hard Disc (Technomatic)
Linnet Modem
Series Four Modem
Master Cartridges

A Whole Host Of Reviews, covering the latest Software, Hardware, Books and Games.

GENERAL : Hints

InterWord and Long Commands
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Self Destruct Function Keys
Crosswords with Spellmaster
Two Programs in Memory at Once
InterWord Multi-File
Giant Scroller
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Getting Input
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Determining the Current Mode
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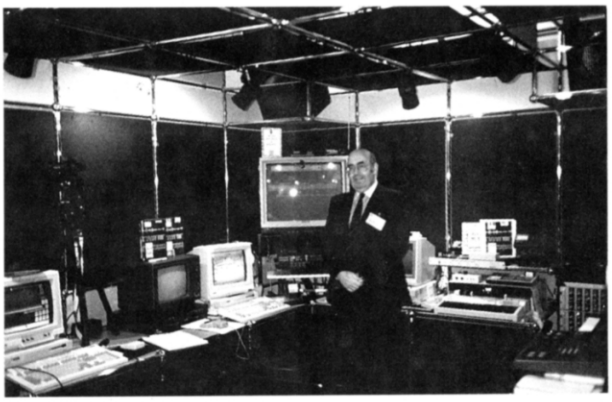
NEWS beat

Duet in harmony at Music Fair



ACORN struck the right note when it teamed up with Electro Music Research to put the Archimedes through its musical paces at the recent British Music Fair.

It was an ideal opportunity for both companies to demonstrate the versatility of the Archimedes as a musical workstation, and further proof that Acorn is committed to what it sees as a rapidly expanding market.

"The BBC and Master series micros are already widely used in the music technology field", said Ian Laurence, Acorn's sales and marketing director, "and we are already seeing a great deal of interest in powerful, low-cost Archimedes-based systems".

Unlike most computers, the Archimedes features built-in Midi commands for controlling electronic instruments, samplers, keyboards or other computers and sequencers via a plug-in Midi interface board. And it can be used by musicians of all levels as a composing tool, standalone musical instrument, Midi system controller or as a teaching aid.

The speed of the Archimedes processor allows functions such as music scoring, waveform representation and harmonic analysis to be performed in real time.

And this, coupled with the graphics display controller with built in stereo sound, allows a musician to create and manipulate sounds in a way normally associated with mini computers and dedicated electronic systems.

EMR (0702) 335747 has exploited these features to produce the comprehensive Arpeggio Music System for the Archimedes. Managing director Mike Beecher has been demonstrating it to appreciative audiences in primary, secondary and special schools up and down the country.

He was on hand at the show to demonstrate a variety of musical software and hardware, including a preview of the new Studio 24 Plus system which offers a full recording studio environment on the Archimedes.

He was optimistic about the impact the Archimedes will have on a market currently dominated by the Atari ST: "The response has been quite remarkable, considering the strong position of other micros at present in terms of music, with bands like chart-topping L A Mix prepared to take on the Arc once the Studio 24 Plus is completed.

"It's the overall range of things we can do with the Arc that puts it above anything else at present".

Studio 24 Plus will be on sale shortly at £99 for a basic system pack – realistic costing is a keynote of EMR's policy.

"We've had to restructure to allow musicians and schools to use the Arpeggio system at a price they can afford, choosing the programs they need to get started", said Mike, "even though some, like the Studio 24 Plus are designed to professional standard but are simple enough for an eight-year-old to handle".

All EMR's new music products will be on display at the Electron & BBC Micro User Show in November, where a full stand will be equipped with the latest Midi instruments.

Projects deadline

THERE'S still time for entries to be considered for the 1988 Micro User Innovation Awards, the international competition open to all BBC Micro users – individuals, groups, schools, institutions and businesses.

And the projects entered for consideration can be serious, commercial, scientific or just plain fun – entries so far received have covered areas as diverse as GCSE course assessment, robot control and the archaeo-physics of Stonehenge.

The prizes in the BBC Micro section include an Archimedes, while the winner in the Archimedes section will take home a 24 pin Brother 1709 printer.

Closing date for entries is October 14, and an entry form appears on Page 114. Winners will be declared at the Electron & BBC Micro User Show in November.

Bridge that gap

FOLLOWING up on the success of Colossus Chess, CDS Software (0302 21134) has released an equally well implemented version of bridge for the BBC Micro and Master.

Colossus Bridge 4.0 – designed with both novices and experienced players in mind – can be used as either a tutor or an opponent, offering fast response time, the ability to save and load part completed games and an input option for problem solving sessions.

There are also rebid and replay options to allow players to learn from their mistakes.

The program plays the Acol system and incorporates three popular conventions – Blackwood, Stayman and Baron. For the uninitiated, a copy of Begin Bridge by G.C.H. Fox is included in the package. Price £11.99 on tape, £14.99 on 5.25in disc.

Database for Z88

THE Cambridge Z88, already recognised as having strong word processing and spreadsheet capabilities, is now supported by a new database package from Wordmongers (0296 437878).

ZBase is written in a format that will be familiar to users of some of the most popular database packages on the market, hence many off-the-shelf applications can be transferred to run on the Z88.

It's claimed that zBase also makes applications software development easier, while the package certainly gives Z88 users a faster search facility and the ability to index data.

ZBase is supplied on a slot-in rom cartridge priced at £69. A further application developers' version with a run time module should be available by the end of the year.

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NEWS beat

Fast fire joysticks

CRUISER joysticks first appeared on the scene late last year. Now Powerplay (0604 768711) is following up its successful debut with the introduction of two new models.

The streamlined Black Cruiser, priced at £9.99 and the Designer Clear Cruiser at £12.99 both have dual leads and the Designer model offers instant auto fire.

Both have microswitches all round, are sturdily built and can be used desk mounted – secured by four suction feet – or hand held.

Powerplay is also claiming a first – both Cruisers have a three way power control which allows different levels of tension in gameplay.

Colourful plague

A NEW disc-based text adventure for the BBC Micro, Master and Archimedes called Plague Planet has been released by Alpine Software (0762 42510).

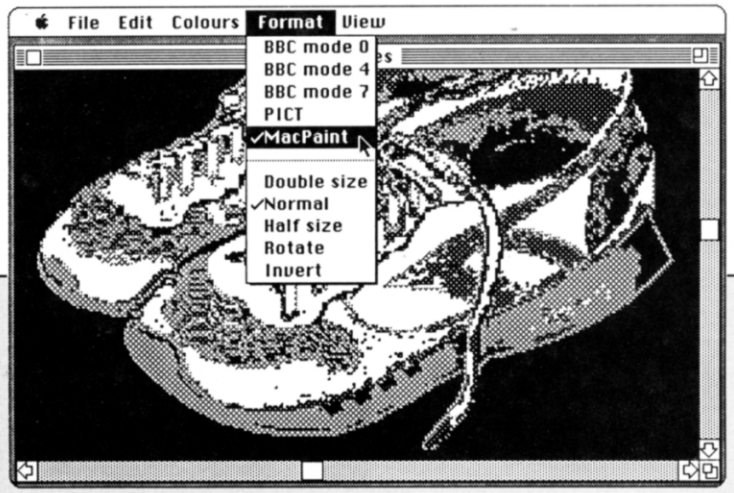
Priced £11.95, it uses a specially designed character set and a range of colours to help identify location descriptions, prompts and computer responses.

With graphics and character set designed by Keith McAlpine of Gem Electronics, Plague Planet has over 250 locations, and more than 1,000 messages of highly compressed text.

Alpine has also announced that its Alps games creation system for the BBC Micro and Master will soon be available for the Archimedes priced £28.95.

No crisis

RBRC Software (01-946 8641) says it has sold out of its business simulation Crisis Management. A new production run of 500 should be ready by November, said a spokesman.



Mac-BBC Micro graphics swap

THE best of both worlds – BBC Micro and Apple Macintosh – is being promised by Human-Computer Interface (0223 314934) with the release of ScreenMac.

The program provides the facility for exchanging graphics between the two machines, so that BBC Micro screen displays can be output direct to Laser writer or incorporated in Macintosh-generated documents.

ScreenMac also supports Macintosh graphics applications such as MacPaint and Hypercard, and can transfer photographic images to a BBC Micro via a Mac-based scanner.

Screen image files created on the BBC Micro can be read by ScreenMac, and in the colour modes pattern shades are assigned to give the best monochrome approximation to the original.

Pictures can be read or saved in either MacPaint or PICT format on the Macintosh and options allow graphics to be scaled, rotated or inverted. Price £56.35.

Games for the Arc

LATEST entertainment software house to announce plans to support the Archimedes is Grandslam (01-247 6434).

The company has released its hit game Terramex for the Archimedes, price £19.95, and will follow this up with The Hunt for Red October, Flintstones and other games.

"Terramex is one of my personal favourites, and after discussions with our technical staff it became apparent this should be our first offering for the Archimedes", said managing director Stephen Hall.

"I'm a great believer in the advancement of computing technology and I think it is important to support this type of hardware.

"It's also a test for us as well – I'm sure a number of other publishers out there will be watching closely to see how our first Archimedes product performs".

Wizard adventure

ADDICTS of The Princess and the Ring from Cambridgeshire Software House (0480 66805) can relax – a sequel is on hand.

The Wizard Strikes Back, an adventure in its own right, is now available for the BBC Model B, Master and Compact. Aimed at children between 7 and 9, the game is backed by an audio story tape and printed resources. Price £31.05 for the Compact, £26.45 for other versions.

CHS is also releasing a version of PSS: A First Spreadsheet – previously available only for the RM Nimbus – for the Master 128 and Compact. Price £29.90 and £34.50 respectively.

It's a Dutch treat

DUTCH BBC Micro users are holding their sixth annual exhibition and conference in Rotterdam on October 15.

Founded in April 1983, the Big Ben Club is believed to be the biggest group of Acorn enthusiasts outside the UK.

The club now has more than 3,500 members and 1,500 people attended last year's show. This year's event will feature special presentations on education, genealogy and communications by the club's activity groups.

SOFTWARE FOR THE BBC MICRO & ARCHIMEDES

Archimedes Podule

A plug in podule which accepts up to 7 ROMS or RAM chips (each chip can be up to 128K bytes). Optional battery back-up for the RAM. Includes a full-feature RAM filing system (fully ADFS compatible) allowing storage of files up to a possible 896K bytes, as if they were on disc. Easy to install and comes with a full manual. NB: requires prior installation of a podule backplane. £49.00 + VAT or £59.00 + VAT with battery.

Speech System

Used in conjunction with the TMS 5220, the Speech System (Speech ROM and Text to Speech ROM) enables BBC B users to easily produce the entire range of English speech and intonation from their machines. NEW PRICE: £25.00 + VAT (+£5.75 for the 5220 if required).

Accelerator

The most comprehensive BBC BASIC compiler, with full floating point arithmetic. Can compile to an intermediate G code, which ensures that the object code is compact, but utilities are also provided to convert G code to faster machine code. NEW PRICE: £30.00 + VAT.

Mega-3

Recently released version of Inter-Word, Inter-Sheet and Inter-Chart, all on one 128K chip. BBC: £85.00 + VAT (ask for details of exchanges).

Wordwise Plus

A 40 column word processor with a flexible and simple BASIC type programming language for user specific programs. On ROM for the BBC, disc for the Archimedes.

BBC: £49.00 + VAT.

Archimedes: £20.00 + VAT.

Spell-Master

A 128K spelling checker on ROM, with a 57,000 word dictionary. Can check as you type in Wordwise, Interword or View, allows creation of user dictionaries & dictionary browsing. Crossword, anagram and fuzzy checking features. A completely new version for the Archimedes, with extra features. BBC, Archimedes and Z88: £51.30 + VAT.

Computer Concepts Ltd

Inter-Word

A full WYSIWYG word processor on ROM. Features include ruler controlled margins and tabs, simultaneous on screen display of printer highlights and text alignment, multi column printing, multi file operation, 40/80/120 column screen modes. BBC: £49.00 + VAT. Archimedes: £39.00 + VAT.

Inter-Sheet

An easy to use spreadsheet on ROM. Features include 255 rows × 64 columns with individually adjustable width, full range mathematical functions, selective printing, lockable boxes/rows/ columns, 40/80/132 column screen modes, auto step on. BBC: £49.00 + VAT. Archimedes: £39.00 + VAT.

Inter-Chart

A comprehensive chart and graph plotting program on ROM. Features include bar graphs, pie charts and line graphs (up to 16 in memory at once, overlay/print in any combination) auto/manual labelling, accepts data from file/keyboard. BBC: £32.00 + VAT. Archimedes: £25.00 + VAT.

Inter-Base

A database on ROM, based around a powerful programming language. Features of the card index program include menu operation, variable field length & number of fields per record, unlimited records, full conditional search & sort, fast search via indexes. BBC: £60.00 + VAT.

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NEWS beat

Thieves warned off

HOME computer systems and peripherals are prime targets for the modern burglar. To help minimise the risks, Markitwise (088 66226) has come up with an effective means of security marking.

For £1.90 the company supplies Diamarker, a diamond tipped engraving pen which will "write" on plastic, metal or glass.

Equipment marked with the owner's name and postcode is less than attractive to thieves, and if stolen and recovered by the police, security marked items can quickly be returned to their rightful owners.

Other items in the Markitwise range include stencils and fabric and ceramic markers.

Card aids police

STRETCH, squash, flip and rotate are what the new Archimedes video digitiser expansion card is designed for. It may also help catch felons.

From Watford Electronics (0923 37774), the £249 digitiser provides professional video processing for applications like desktop publishing, animation, image analysis and recognition, interactive video and automatic inspection.

One of its earliest uses, however, has been by a Midlands police force in connection with a recent murder enquiry.

"We used the product to evaluate pictures grabbed from a videotape", said a police spokesman. "We were very pleased with its performance and hope to use it in further police work".

Images are captured in real time – 1/50th sec – from a video camera, or off-air TV signals may be input via a video recorder or TV tuner.

Pictures are digitised to 512x256 pixels, each with up to 64 levels of greyscale, for display on a normal monochrome monitor or colour monitor with composite input.

It is also possible to digitise to 512x512 pixels if the picture is stationary for around 0.1 seconds, for display on a multisync or interlaced monitor.

Once in the computer's memory the software contained in the on-board rom controls the video manipulation and display.

Sprites can be created from all or part of the digitised image to port into other programs, and images can be loaded and saved in a compressed format.

The digitiser is a single width expansion card and can be used with all Archimedes 400 series computers, and 300 series machines fitted with an expansion backplane.

Micro helps solve world war riddles

FORMER prisoner of war Peter Dunstan is using his BBC Master to solve one of the mysteries of World War II.

He told *The Micro User*: "During the last war many thousands of Allied servicemen were taken prisoner by the Japanese and put to work.

"Among these projects were the infamous Death Railway in Burma and the real bridge over the River Kwai, as opposed to the fictional one that was portrayed in the film.

"The Japanese kept little or no records, and while there were over 70 camps in the jungle along the railway construction no details exist as to exactly where 12,000 Allied soldiers died".

In Thailand and Burma where the camps were situated there are today three cemeteries where Allied forces are buried.

Research work has been going on for the last five years to re-discover their original places of death.

Said Peter: "As a former prisoner of war myself I have put my Master and database to work on this project.

"By having a code for each camp, and with the help of diaries still held by other prisoners of war, it has been possible to place nearly 90 per cent of the names into their original camps".

Peter keeps the lists on discs, filed in alphabetical order, by name, regiment, age, date and location of grave, and hopes eventually to trace the missing 10 per cent of POW names to complete his task.

Expanding library

ONE of the most popular areas of MicroLink – the Telesoftware Library – has achieved a new milestone, with the number of programs now available topping the 800 mark.

Much of the demand for the service comes from BBC Micro users, who have the biggest section of the library at their disposal – a total of 243 programs. And that number is increasing all the time as the listings from each issue of *The Micro User* are added to the library.

Games, utilities and educational programs for the BBC Micro are all readily available, and recently a Z88 section has been introduced which has already attracted a lot of interest.

The Arc goes west

ACORN enthusiasts in the South West of England have been treated to their own special viewing of the latest products for their machines.

The event was the idea of Chris Netherton, general manager of Cornwall Acorn distributor Microtest.

"Places like London or Manchester are somewhat remote from Cornwall", he said. "We felt the best way of promoting an awareness of Acorn products in general, and the Archimedes in particular, was to invite firms to come to us.

"In this way both business and other users in the county could see what was on offer".

An audio-visual presentation demonstrated the capabilities of the Archimedes both musically and graphically.

Watchers were amazed at the speed of a CAD demonstration package and sound effects ranging from a thunderstorm to a realistic snatch of Widor's Toccata and Fugue for organ.

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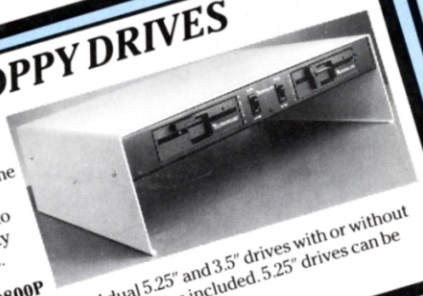

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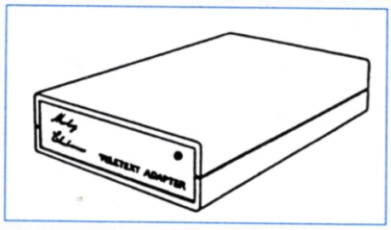

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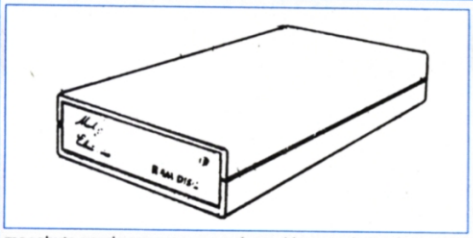

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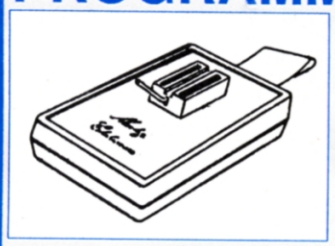

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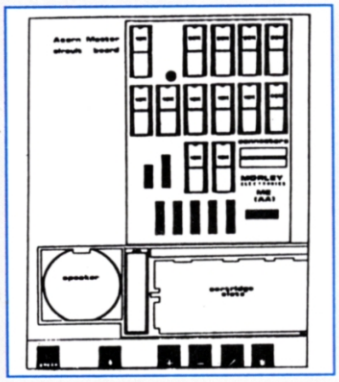

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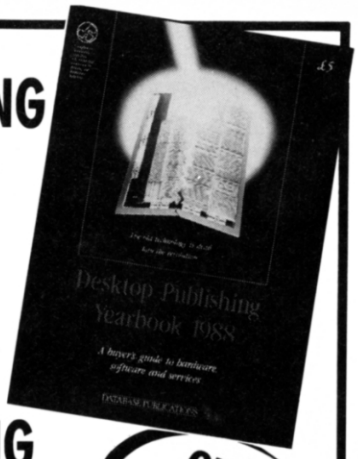

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SOFTWARE SCENE

Time and Magik ... the price of success

Price: £14.95 (tape), £19.95 (disc)
Supplier: Mandarin Software, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.

MANDARIN Software's most recent release is an enhanced re-issue of three Level 9 classics, retitled **Time and Magik**. Designed primarily for the Master 128 or the 128k B+, this blockbuster will have BBC Micro owners reaching for their cheque books – either to buy the disc, or else to upgrade their micros and *then* buy the disc.

For precise hardware requirements, please refer to the end of this review, meanwhile, I'd like to make some general comments before dealing with each part of the trilogy in turn.

The packaging and its design is one of the best I've seen in a long time but recent experience with glossily-packaged offerings has made me suspicious – all that glisters is definitely not gold.

However, readers with long memories will know that it was the Level 9 team of Peter and Mike Austin who set the standard for BBC Micro adventure games: A standard which other programmers then had to aim for – and those who have succeeded leave a spare finger on one hand, so far as I'm concerned. The contents of this package will not disappoint you.

The booklet provided with the disc gives helpful playing instructions, indicates how advanced the parser is and provides an interesting short story by Peter McBride linking the three games, **Lords of Time**, **Red Moon** and **The Price of Magik**.

In addition to greatly expanded text, there are now many different and superbly drawn pictures which, by dint of clever combinations, help to enhance the atmosphere as you proceed through each adventure.

Lords of Time – brainchild of Sue Gazzard – opens the scene and I noticed certain changes as I played through it – I classified most of them as improvements. There are extra clues planted into the text in this version like a picture of an ancient gent sitting in his bath – said gent eventually fell foul of ruffian soldiers while playing on the beach.

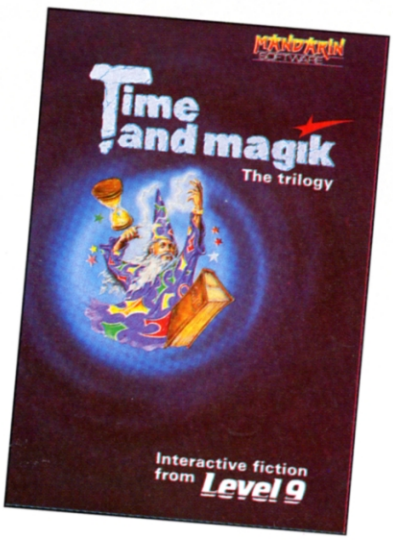
Again, the required anagram in the Dinosaur Age is now broken down into the number of letters each word requires, thus making it a less steamy problem. The icy-cold stream that gave me such trepidation in the original adventure has been changed into an icy tunnel – just as forbidding but a little more likely to lure you into it. Similarly there's a more helpful description to read now when the Lur is found than there was in the original version of the game. A final change I noticed was in the Hedge Maze – it has been slightly redrawn.

Your task in all this abundance of riches is to explore nine different time zones. There you will find treasures to collect plus nine vital ingredients which together make up a spell to destroy the baneful influence of the evil Lords of Time.

A lovely game when it first came out, and it's even better now.

I can still remember the frisson of pleasure I experienced when **Red Moon** was released. Then a cassette-based adventure, I took it away with me to our summer holiday cottage and, thanks to foul weather, solved it during the fortnight.

Red Moon was the first attempt by the Austins at an adventure involving both magic and combat and contained more than 200 locations for the standard BBC Micro – an indication of the text-compression skills that first rate programmers can call upon.



Your task is simple: Locate and retrieve the fabled Red Moon Crystal collecting treasures as you go. Needless to say, achieving this is nothing like so simple.

You start out in the open and I recommend a thorough exploration here before you disappear down the pothole and into the cave system beneath the Castle of Baskalos. Certain essential items and at least one treasure are to be found above ground.

I would advise careful examination of the bushes by the Lakeside Folly: You can then drain the lake and open the locked gateway to the castle. You will also find that the horseshoe is a very attractive implement.

A dungeons and dragons atmosphere is created both by the use of magic and combat. You start off with 50 hit points, but these are depleted in combat and each time you use a spell.

Combat ought to be avoided wherever possible for two reasons: Firstly, until you locate and wear the armour you are very vulnerable indeed and, secondly, even if you are victorious the shade of your departed adversary will eventually come back and force you into combat once more.

The only implacable opponent is the Blacksmith – you *must* fight him, but if you are gravely damaged there is hope in the form of a restorative potion available in the sick bay.

The Price of Magik was the sequel to Red Moon, but differed in emphasis – much more magic and much less violence were the order of the day.

You have to rescue the Red Moon Crystal from the evil magician Myglar. To do this requires persistence and, above all, the acquisition of magical competence accompanied by the consequential loss of your sanity.

The bulk of the action takes place in a decaying mansion which is reminiscent of Dr. Who's police box – it's a lot larger inside than the outside would suggest.

Once again, careful exploration of the outside areas before entering is the order of the day. I climbed up the vine, preferring this devious approach to that of walking in through the front door. This gained me access to a number of spells quite quickly. You can't start to cast spells, however, until you have located the scroll which is found most easily via the vine.

Time and Magik will run with full graphics on the BBC Master, 128k B+, 64k B+ with sideways ram, and BBC B with sideways and shadow ram.

It will run text only on the 64k B+ and the BBC B with sideways or shadow ram – but notice that the following shadow ram boards are the only ones catered for at present: Aries B20 and B32, Computech Integra-B, Solidisk Twomeg 128k, Twomeg 256k and Fourmeg 256k and finally the Watford 32k shadow ram.

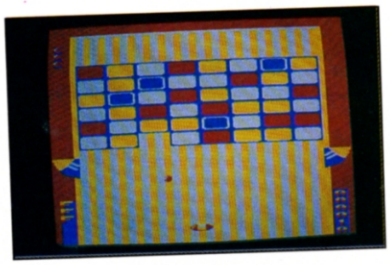
Mad Hatter

Atmosphere	9
Complexity	9
Presentation	9
Value for money	9
Overall	9

SOFTWARE SCENE

Round Ones ... still breaking out

Price: £1.99 (tape)
Supplier: Alternative Software, Unit 3-6, Baileygate Industrial Estate, Pontefract. West Yorkshire.
Tel: 0977 797777



ONCE upon a time, just about in the dark ages as far as computers are concerned, there was a simple little game called Breakout. In this game you controlled a bat and had to hit a ball which bounced off various blocks and destroyed them.

The Breakout idea vanished into the wilderness for about five years but has now re-appeared in a number of guises. Alternative's Round Ones is the latest addition and comes firmly at the budget end of the market.

In this version, the bat has become an Assault Transport and the ball is an Assault Laser Launch. Many of the blocks are simple and require one hit of the ball to destroy them. Others, coloured yellow, require two or more hits. Red ones increase the speed of the ball while black blocks release driblets that can increase the size of the bat – although it might reduce it at other times – or they may cause the entire screen to explode.

Destroying all of the blocks on one screen will move you to the next. When you have completed eight screens the next set is automatically loaded from the cassette. There are some 100 or so in all of which the second and subsequent sets of screens introduce more difficulties.

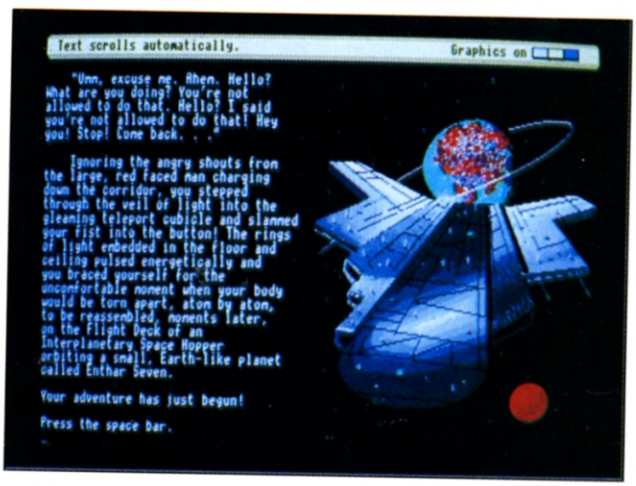
Lasers fire at you and multi-coloured conflictors can cause havoc with the ball. Your force field protection will come in very useful, but this is in limited supply and must be used sparingly.

The quality of Alternative games has certainly improved recently and Round Ones will make a worthy addition to your collection. I have one major gripe about the game. It features some really clever multi-coloured backgrounds which look superb, but can act as almost total camouflage for the ball. I feel that the game would have been better with simple plain colours behind the balls.

Rog Frost

Graphics	7
Sound	4
Playability	8
Value for money	9
Overall	8

Enthar Seven ... escape from space



Price: £29.95 (disc)
Supplier: Robico, 3 Fairland Close, Llantrisant, Mid Glamorgan CF7 8QH.
Tel: 0443 227354

THIS disc-based text adventure was originally available for the BBC Micro and has now been re-written for the Archimedes with some graphic screens added. Robico does a thorough packaging job but I wonder if that has pushed the price up unnecessarily. Apart from the disc itself, a detailed booklet is supplied and a hint sheet, notepad and Robico pen – perhaps that should have been a pencil and rubber.

Your objective in the first instance is to get off an interplanetary space hopper which is in imminent danger of crashing. But having arrived safely on the semi-derelict planet your problems have only just started – your real adventure is the escape from Enthar Seven. The game is massive, boasting 80 objects, all of which are of value, and 450 locations – one is described, tongue in cheek, as giving you the feeling that it is only there to make up the number.

There is no way you are going to complete this adventure without drawing a map. Be warned too, this is not for those with either a short temper or low concentration span.

You can save and re-load your position to any disc at any time with a filename of your own choice. The command structure also allows you to issue many system instructions by prefixing them with @.

Generally I prefer adventures to start very easily and become progressively harder as the game develops. Unfortunately the very first puzzle requires a certain amount of lateral thinking. If you don't get it immediately you are likely to waste several frustrating hours.

But once on the move, the game becomes easier to get to grips with. Well for a while anyway. Finding directions embedded in the text can be a bit difficult sometimes if you don't read it properly though this does encourage you to take your time and enjoy the scenery.

The graphic addition is nice especially as some pictures are at the top of the screen and others at the side. However, apart from adding a little atmosphere there are no additional clues and have the feel of being tacked on to take advantage of the Archimedes' graphics.

The 80 column text builds quite a respectable atmosphere and is a good read – a feature sadly lacking in many adventures. After playing the game for a while you really do get the feeling that almost everyone has gone somewhere else and you start to mentally look over your shoulder.

Puzzles are detailed and fairly linear – it would have been nice if the game was structured so that more of the threads could be followed independently. Later you can do this to some extent – when bogged down in one area you could continue with some other aspect and return later. At this point you find out why it's called Enthar Seven.

I'm far from completing the game but it is pleasing to see fair puzzles and believable solutions. Some of the clues are rather oblique but that really adds to the fun. As usual you need to put yourself in the right frame of mind. One bonus point must go for the good sense of humour running through the game – try typing score and see what happens.

One indicator of the re-write status is the parser – though it can handle multi-statement input, it is not at ease with it and can easily be confused. Try *Pick up the helmet* which will get this object for you and then tell you that you can't do it. I did contrive that example but this sort of thing is a nuisance.

To sum up, a good logical adventure that should keep you busy for many hours – despite the parser.

Terry Blunt

Presentation	8
Atmosphere	7
Graphics	8
Value for money	6
Overall	6

SOFTWARE SCENE

Anarchy Zone ... blasting bargain

Price: £2.99 (tape)
Supplier: Atlantis, 28 Station Road, London SE25 5AG.
Tel: 01-771 8642

AFTER four years you might imagine that every possible variation of the space shoot-'em-up scenario had been used. However, here comes yet another action packed, if-it-moves-blast-it type game with a slightly different slant on those old favourites, Space Invaders and Galaxians.

It's called Anarchy Zone, and is released on the Atlantis budget label. This time the Galactic Government Dictatorship has divided up the galaxy into separate zones, and within these space travellers must restrict their flight paths to predefined routes.

Anyone straying from these narrow space lanes is liable to be fired on, and guess who has wandered into deep space? Yes, you have, and you are now under attack by wave after wave of all manner of alien vessels, all armed to the teeth with lasers, bombs and missiles.

The screen is split into two areas: The larger one is where the action takes place, while the smaller contains the score, power and remaining bonus. You start off with your ship at the bottom of the display, and an alien battle fleet streams on to the screen, guns ablaze. You can move left and right and blast them with your own laser.

This may seem pretty ordinary so far, but where this game is different is that while the aliens swarm round the screen you can circle them, climbing up the sides of the screen and zooming across the top to attack them from the rear.

Some aliens require several hits before they explode, and some seemingly indestructable ones will have you scratching your head trying to work out how to destroy them – if you can manage the time to take your hands off the keyboard, that is.

On wiping out a wave of aliens a new one appears with a different battle formation without giving you time to get your breath back, and it's into battle again.

At the start of each new zone a password is given, and this can be used to skip screens you've already mastered. This prevents the game from becoming tedious as you can continue from the screen you were finally destroyed in last time.

The graphics are excellent, with brightly coloured alien ships and an attractive control panel on the right. The sound effects are good, too.

At only £1.99 this must rate as a superb bargain arcade game that mustn't be missed. If you like fast action arcade games you'll be quite at home with this and I can thoroughly recommend it.

Roland Waddilove

Sound	8
Graphics	9
Playability	9
Value for money	9
Overall	9

The Taroda Scheme ... refreshing comedy

Price: £7.99 (disc)
Supplier: Heyley Software/PRES, 6 Ava House, High Street, Chobham, Surrey GU24 8LZ.
Tel: 0276 72046

THE Taroda Scheme comes on disc in plain packaging with an extremely useful leaflet which gives background information and provides an atmospheric and amusing introduction to the adventure. Comprehensive Help sheets are also available.

It's set in the year 10340 AD, long after the destruction of Earth. Taroda is one of many planets to have been colonised by humans centuries previously. It is now an important source of methane gas and an ore known as Strykalite, which is exported as barbeque lighting fuel to the planet Sartravaag.

Your mission is fairly mundane. It is to make the five-yearly check on the system of Taroda to ensure that all is well – it isn't.

You begin your adventure on the bridge of your spacecraft on its journey to Taroda. A quick glance at the vide-screen shows that something large and ominous is on a collision course with your ship. This is akin to Robico's Enthar Seven or The Hunt, as you scramble together belongings and find a safe way to leave your doomed craft.

I suggest that you thoroughly SEARCH the desk in your quarters, take the shower operating unit from the bathroom and gain some sustenance before facilitating your escape.

On the planet you will soon discover the first of many corridors which could pose a really suffocating problem. In order to continue, you must find a plan and read it carefully! This is a variation of the Snark tunnel problem in Acornsoft's Kingdom of Hamil.

Room descriptions and messages are lengthy, well written and you only have to EXAMine the items which are presented in magenta text – a bit difficult with a green screen monitor.

Everything about this adventure contains a refreshing smattering of wry comedy. The only time this sank to the depths of lavatorial humour was when I discovered a suction toilet in the bathroom *to avoid those low gravity accidents.*

However, the following is a prime example of good response to correct input: *As the soup touches your tongue, it liquefies and trickles down your throat. Suddenly something hard and angular sticks in your mouth and you spit it out, choking violently. A wave of deja-vu hits you, with an image of a cold stone room.*

I must admit that I loved the idea of the MentOp system which allows for ESP thought processes to operate equipment. I also chuckled at the kickerboots for which an intergalactic soccer thug would give his one remaining tooth. It is sobering to later find a compact disc as an item of antiquity.

The Taroda Scheme has over 230 locations, nearly 100 objects and 200 messages, and should provide a real challenge to any discerning adventurer.

Problem construction is excellent, although the parser seems rather limited, especially regarding synonyms for the nouns. I did discover a few spelling mistakes, such as *hygene* and *liquify*.

However, with a little more polish and development, Heyley could soon challenge Robico, Level 9 and Infocom as a serious producer of micro adventures.

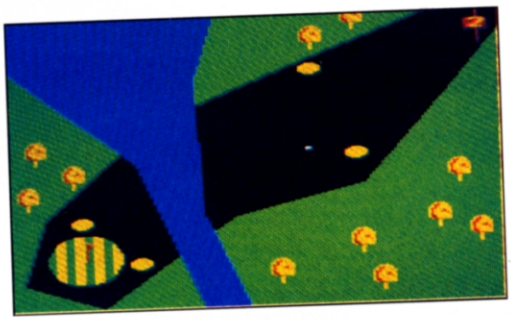
Pendragon

Presentation	6
Atmosphere	8
Frustration factor	8
Value for money	9
Overall	8

SOFTWARE SCENE

Golf ... above par simulation

Price: £1.99 (tape)
Supplier: Blue Ribbon, CDS House, Beckett Road, Doncaster DN2 4AD.
Tel: 0302 21134



GOLF is another of those popular spectator sports which occupy vast amounts of television time and it's a game which you either love or hate. This simulation, brought to you by Blue Ribbon, is one of the better attempts I have seen at converting this fascinating game of skill to the micro.

The loading screen is – in typical Blue Ribbon fashion – simple and the game loads reasonably soon after. The first thing you see is the leaderboard with the top five rounds and a six-note ditty introduces the game.

The current hole is graphically depicted from overhead giving you a bird's eye view of the action. The fairway, rough, green, trees, bunkers and water hazards are all shown. A flag marks the hole and the tee. Additional information provided is the distance to the green, the par for the hole and the wind direction.

First you select your club from a bag containing four woods, nine irons and a sand wedge. There's no indication given of how far these will carry the ball, so for the first few holes it will be down to trial and error.

After selecting your club you are required to enter the direction and power of the shot. The direction is shown as a pointer which you can rotate left and right using Z and X, while the power is increased and decreased with the up and down cursor keys. Return hits the ball with your chosen direction and power.

You are told where the ball landed – on the fairway, in the rough, in the water and so on. You are prompted for more shots until you are on the green.

The screen then clears and you are presented with a magnified view of the green showing the hole and your ball. Additionally you are told whether the green is fast or slow so you can adjust the power of your shot accordingly. The club – a putter – is chosen automatically.

When you've finally holed the putt your score card is shown. Here you can see each hole played, how many shots you took, the par for the hole and distance. Also your overall score is displayed. Then it's on to the next hole, and so it continues for the rest of the course. The graphics are reasonably good and the gameplay is interesting enough to prevent the game from becoming too tedious. The only feature I would have liked to see is a multi-player option, or a two player facility at least.

I quite liked this simulation, though if you're not a golf fanatic it may not hold the same appeal. As a budget buy it can't be bad.

Roland Waddilove

Sound	4
Graphics	7
Playability	7
Value for money	8
Overall	7

Darts ... one hundred and eighty!

Price: £1.99 (tape)
Supplier: Blue Ribbon, CDS House, Beckett Road, Doncaster DN2 4AD.
Tel: 0302 21134

JUDGING by the amount of prime time television devoted to darts, it must be one of the most popular sports around – at least with the armchair athlete brigade. Me, I prefer to get up and have a bash rather than sit and watch, so it was with some enthusiasm than I tackled Blue Ribbon's latest budget release, titled simply, Darts.

The loading screen is plain, but I'm not grumbling as there is nothing more infuriating than waiting for a 20k title screen to load before you can get into the game itself.

After this comes a short program containing instructions and, as this is essentially the same as supplied on the cassette insert, it isn't strictly necessary. This program then loads the main game.

First up comes a simple menu and you can choose from three different types of game, all played on the dart board. The first is 501 – the game so popular on television.

Both players enter their names followed by the score they wish to start on – there is no need to start on 501, and you can start from any score up to 1001. All games are two player and I was disappointed that there's no option to play against the micro as it's not always possible to find a partner.

Each player takes it in turn to throw his three darts and his score for that throw is subtracted from his total. The object is to get your score down low enough so that you can throw a double which will zero your total before your opponent manages to do the same.

The screen displays a large dartboard with running totals down each side for both players. When it is your turn to throw you use the Z, X, * and ? to try to position your erratically moving dart as best you can. Holding down the spacebar releases it.

The second game is Round the Board, involving thowing a dart into each number up to 20, followed by the outer then the inner bull. You have the option of making it harder by specifying that the doubles or trebles only must be hit. As before, on-screen scoring keeps track of your progress.

The third game – my favourite – is cricket. Each player takes it in turn to throw as usual, but this time one is batting and the other bowling. The batting player tries to score as many as possible and each throw is added to the last.

The bowling player tries to score an outer or an inner bull. The former counts as one wicket, while the latter counts as three.

The innings is over when 10 or more wickets have been taken and the players then swap over batting and bowling. The winner is the one with the most number of runs.

The graphics are simple, with a board shown head on with the darts as crosses. The throwing action is again simply executed with a randomly moving dart which you can control to some degree by four keys for up, down, left and right. The spacebar throws the dart – it just becomes fixed at its current position and stops moving. There's no sound to speak of, just a few notes played when you win the game.

For a budget game it's OK, but nothing to write home about. I found it quite interesting at first, but it soon became tedious, despite the three different games.

Roland Waddilove

Sound	3
Graphics	6
Playability	6
Value for money	7
Overall	6

FAX Pack

FAX PACK FOR THE ARCHIMEDES

The Computer Concepts FAX PACK adds the power of the Archimedes computer to a FAX machine. It includes the following features:

- A FAX modem podule that simply plugs into any Archimedes computer, and then into any standard telephone socket. It is possible to connect a conventional phone in parallel.
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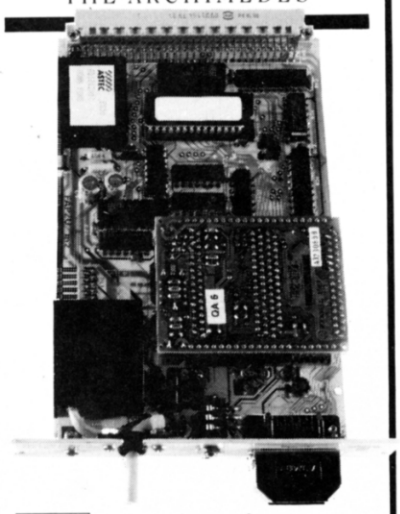
- Auto-dial allows other computers or FAX machines to be dialled by the computer. Either a phone number or a name can be specified. Names are looked up in a phone number directory file to obtain the correct number.
- FAX images may be viewed on screen, within a window, where they may be scaled, scrolled, cropped etc., and then saved again as a FAX file. Facilities are included for printing out FAX files on a variety of dot matrix printers, including the most common 9 and 24 pin versions.



The popularity of FAX machines has increased to such an extent during the last twelve months that they now outnumber TELEX machines. In today's successful business, a FAX machine is as vital a piece of office equipment as a telephone.

- Since FAX modems work at 9600 bits-per-second, this allows direct file transfer at least 4 times as fast as the fastest conventional modems. Indeed any file can be automatically sent, **or obtained** from a remote machine.
- The software automatically detects the type and group of machine dialled. It can also detect a suitably FAX equipped computer. If it other end, similar to this computer, then it can avoid the FAX protocols and transmit the files, error checked, directly to the remote machine.
- Auto dial and auto-answer hardware which sends or receives any group 3 FAX, and saves on the current filing system as a suitable FAX file.

Most facilities are available from simple logical star commands, such as *DIAL Fred and *SendFAX file office.

FAX PACK INCLUDES:

The FAX podule for plugging into any Archimedes computer, (fitted with a back-plane) and software as described above.

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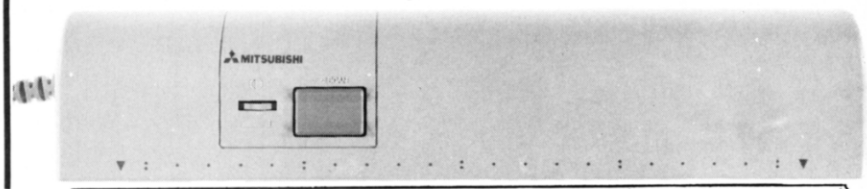

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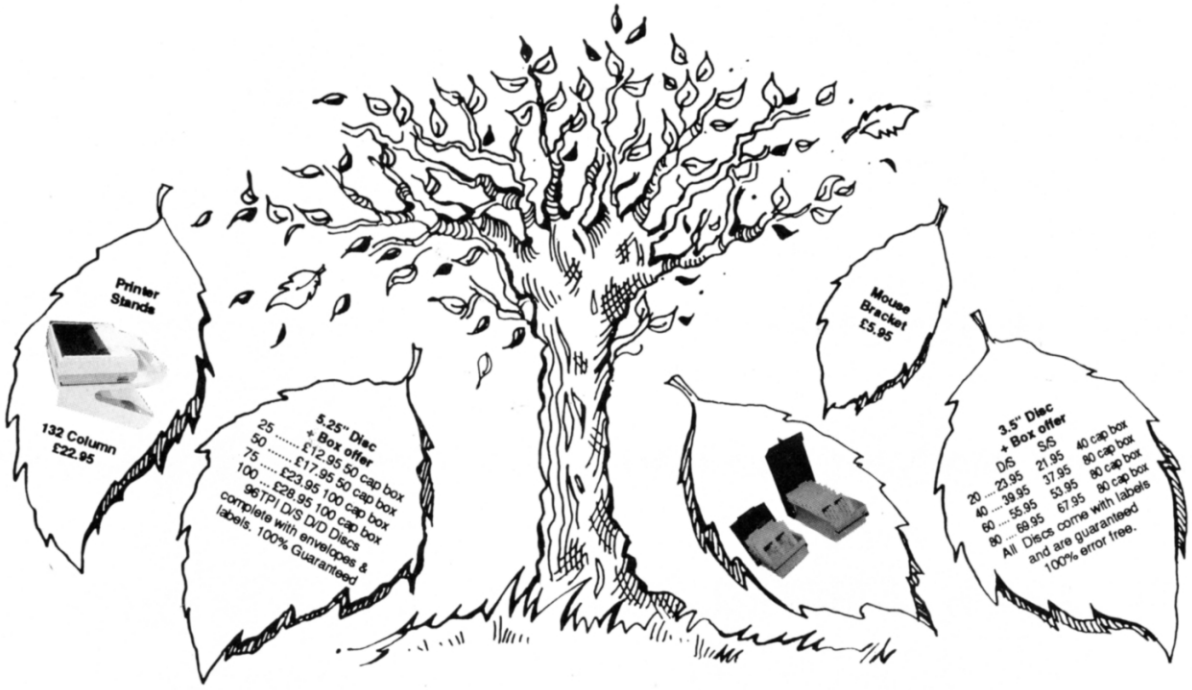

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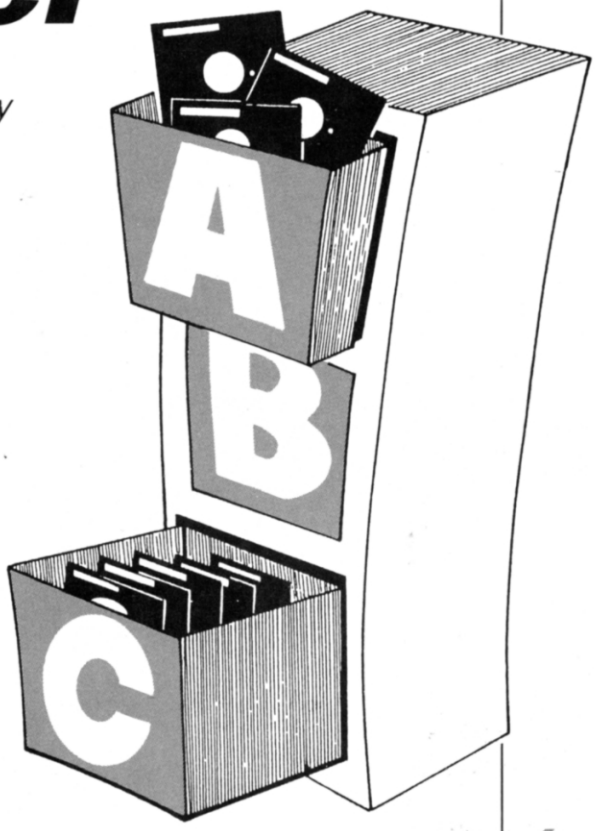
ACCESS VISA E. & O.E.

The search is over

Richard Hull makes finding ADFS files easy



THE ADFS has a hierarchical file structure – directories within directories – which means that the total number of files on a disc can be enormous. Trying to find a particular one can be a nightmare, but with this superb program you save the catalogues of up to 100 discs in a database designed specifically for the purpose.

This utility will work on all BBC Micros with ADFS – including the Archimedes. The number of disc catalogues that can be stored depends on the format size – there are four possibilities:

Name	Size(k)	Tracks	Sides	Discs
Small	160	40	single	20
Medium	320	80	single	40
Large	640	80	double	80
Huge	800	80	double	100

The last one is only available on an Archimedes.

To prepare your disc catalogue, first format a fresh disc to the largest size your system can manage and create a boot file for it.
Use *BUILD !BOOT and enter:

```
0001 *BASIC
0002 CHAIN"$.Catalogue"
0003 <Escape>
```

Then type *OPT 4,3 to set the Exec option.

Now type in the Create program – Listing I – and ensure it's correct using Get it Right! Save it on a utility disc – you only need to use it once for each catalogue disc – then enter Listing II and save that as *$.Catalogue* on your newly formatted data disc with the !boot routine.

Run the Create program and follow the prompts to automatically set up three data files. The first – Config – contains four items of data – the catalogue data file name, the number of discs that will fit, the amount of space within the data file allocated for each catalogue and the assumed maximum length of the disc title.

DataFile reserves the space for the catalogue information – 8k is reserved for each – and Discs holds each disc title and the number of files.

Now you're ready to start cataloguing your disc collection. It's quite important that each of your discs has a title and – for your own good – make sure it's also on the disc label so you can find the right disc easily. If there is no title the Catalogue program entitles it *Unnamed n* where *n* is a sequence number. But this is reset each time the program is run so there is a chance that a new unnamed disc will get the same sequence number and overwrite the previous entry.

Run the catalogue program and select the first option. When prompted, insert the disc to be catalogued into drive 0 and press the spacebar. The disc title will be read followed by each file and directory. Indentation is used to signify where the file is in the tree structure.

Once all the disc information is read in you are prompted to re-insert the master disc and press the spacebar. There's a short delay while the data is saved then you are returned to the main menu. Repeat the whole operation for each of your discs – but not those you use as work discs because the contents of these will probably be changing frequently.

The search option checks through every name in the data file looking for any occurrences of your input string. If the printer toggle is on, output will also be directed to the connected printer.

Using *view discs* you can browse through your collection using the cursor keys – again indentation is used to represent the tree structure. Directories are marked in magenta and files are coloured green. To stop browsing press Tab or Escape at any time. If you know the disc you want to look at you can use *Jump to a specific disc* and

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"You can save catalogues of up to 100 discs"

◀ *From Page 25*

select the one you want from a numbered list.

If a disc needs updating – when you save new files on to it – use the first option which will read the disc title and compare it to the previously catalogued discs. The disc data with the same name is overwritten by the new information.

So there it is, a simple but effective way of recording your disc details in an easy to use form. You need never search through your discs again for that elusive file.

VARIABLES	
dataSize	Size of data file
discs	Number of discs that can be stored
free	Free space on disc
maxlen	Assumed length of disc title
nameSize	Size of disc title file
alloc%	Space allocated for each catalogue
df$	Data file name

ROUTINES	
arcMake	Create Archimedes file
calc	Work out file sizes
make	Create a file
arcFree	Find free space on Archimedes disc
getfree	Find free space on a disc

```
  10 REM Creating data files
  20 REM by Richard Hull
  30 REM (c) The Micro User
  40 MODE 7
  50 PRINT"Insert catalogue disc and pr
ess space...";
  60 REPEAT UNTIL GET=32:*MOUNT 0
  70 df$="$.DataFile"
  80 DIM blk% 32,n% 16
  90 maxlen=20:alloc%=&2000
 100 PROCmake("$.Config",&100)
 110 PROCcalc(FNgetfree)
 120 PROCmake("$.Disc",nameSize)
 130 PROCmake(df$,dataSize)
 140 O%=OPENOUT"$.Config"
 150 PRINT#O%,maxlen,alloc%,discs,df$
 160 CLOSE#0:END
 170 DEF PROCcalc(free)
 180 discs=free DIV (maxlen+alloc%)
 190 nameSize=discs*maxlen
 200 dataSize=discs*alloc%
 210 ENDPROC
 220 DEF FNgetfree:!blk%=0
 230 IF INKEY-256=160 =FNarcFree
 240 A%=&71:X%=blk%MOD256
 250 Y%=blk%DIV256:CALL&FFF1:=!blk%
 260 DEF PROCmake($n%,size%)
 270 IF INKEY-256=160 PROCarcMake($n%,s
ize%):ENDPROC
 280 blk%!&0=n%:blk%!&2=0:blk%!&6=0
 290 blk%!&A=0:blk%!&E=size%
 300 A%=7:X%=blk%MOD256:Y%=blk%DIV256
 310 CALL&FFDD:ENDPROC
 320 DEF FNarcFree
 330 SYS "ADFS_FreeSpace","0" TO !blk%
 340 =!blk%
 350 DEF PROCarcMake(s$,S%)
 360 OSCLI"CREATE "+s$+" "+STR$~S%
 370 ENDPROC
```

Get it right!

```
 10 =    0 0     60 = DC00 F     110 = A411 1     200 = 8843 1     290 = 66E8 A
 20 =    0 0     70 = 96CB 7     120 = 656B F     210 = ED0F 8     300 = D67E 1
 30 =    0 0     80 = 5E6C 6     130 = D238 1     220 = FB24 C     310 = 20B0 9
 40 = 1092 2     90 =   8D 0     140 = 7CE7 F     230 = 5C89 6     320 = A1E3 D
 50 = 9368 8    100 = C78D 9     150 =  638 D     240 = 952F 4     330 = CD08 5
 60 = DC00 F    110 = A411 1     160 = E1D9 6     250 = 7316 C     340 = 3A8D B
 70 = 96CB 7    120 = 656B F     170 = 2233 9     260 = D0BF 5     350 = C22B 9
 80 = 5E6C 6    130 = D238 1     180 =  4B6 3     270 =  B32 5     360 = E68E 8
 90 =   8D 0    140 = 7CE7 F     190 = 83B5 3     280 = C45B 5     370 = ED0F E
```

```
  10 REM $.Catalogue
  20 REM Richard Hull
  30 REM (c) The Micro User
  40 :
  50 MODE7:PROCinit
  60 A%=0:Y%=0:F%=USRosargs AND&FF
  70 IF F%<>8 THEN*ADFS
  80 ON ERROR PROCerror
  90 REPEAT PROChd(ban$)
 100 PROCcn(CHR$129+"Richard Hull",0)
 110 FORC%=1TOcmds%:VDU31,3,2*C%
 120 PRINTCHR$134C%CHR$131c$(C%):NEXT
 130 REPEAT C%=129:t$="OFF"
 140 IF ptr C%=130:t$="ON "
 150 PRINTTAB(17,12)CHR$C%t$
 160 REPEAT C%=GET-48
 170 UNTILC%>0 AND C%<cmds%+1
 180 IF C%<6 PROChd(c$(C%))
 190 IF C%=1 PROCread
 200 IF C%=2 PROCscan
 210 IF C%=3 discs%=FNldd:PROCview(1)
 220 IF C%=4 PROCjump
 230 IF C%=5 PROCstar
 240 IF C%=6 ptr=NOTptr
 250 UNTIL C%<>6:UNTIL C%=cmds%
 260 PROCend:END
 270 :
 280 DEF PROChd(t$):VDU26,12
 290 PROCcn(db$+t$+eb$,0)
 300 PROCcn(db$+t$+eb$,1)
 310 VDU28,0,24,39,3
 320 PROCoff:ENDPROC
 330 :
 340 DEF PROCerror:CLOSE#0:PROCoff
 350 IF ERR=17 ENDPROC ELSEPROCend
 360 REPORT:PRINT" at line ";ERL:END
 370 :
 380 DEF PROCcat:LOCALA%,X%,Y%,co%,temp
%
 390 A%=8:X%=blk%MOD256:Y%=blk%DIV256
 400 co%=-1:REPEAT:co%=co%+1
 410 blk%!1=buf%:blk%!5=1:blk%!9=co%
 420 $buf%=STRING$(20,CHR$13):?buf%=0
 430 CALLosgbpb:temp%=?buf%:dir=FALSE
 440 n$=$(buf%+1)
 450 IF temp%>0 PROCfile(n$):PROCstore(
n$)
 460 IF dir PROCdir:*DIR ^
 470 UNTIL temp%=0:ENDPROC
 480 :
 490 DEF PROCdir:LOCALdir$,temp$
 500 dir$=FNnospace($(buf%+1))+"."
 510 temp$=prf$:prf$=prf$+dir$
 520 PROCos("DIR "+$(buf%+1))
 530 t=t+2:dir=FALSE:PROCcat:t=t-2
 540 PRINT:prf$=temp$:ENDPROC
 550 :
 560 DEF PROCfile($buf%)
 570 LOCAL A%,C%,F%,X%,Y%
 580 A%=5:X%=blk%MOD256:Y%=blk%DIV256
 590 ?blk%=buf%MOD256:blk%?1=buf%DIV256
 600 F%=USR(osfile)AND&FF
 610 IF F%=1 C%=131
 620 IF F%=2 PRINT:dir=TRUE:C%=130
 630 PRINTTAB(t)CHR$C%$buf%;
 640 A%=INKEY(-500*(C%=129)):ENDPROC
 650 :
 660 DEF PROCread:LOCAL t:file%=0:*FX21
 670 PROCcn(CHR$129+"Insert the disc an
d press Space",0)
 680 REPEATUNTILGET=32:CLS
 690 PROCos("MOUNT 0"):*DIR $
 700 t$=FNdtitle:PRINT"Disc: "t$
 710 prf$="":PROCcat:IF NOTdir PRINT
 720 PROCspace("Insert catalogue disc",
VPOS)
 730 PROCos("MOUNT 0"):discs%=FNldd
 740 IFdiscs%>size%PROCcn("No free spac
e left",VPOS):A=INKEY(600):ENDPROC
 750 flg=0:FORG%=1TOdiscs%:IFINSTR(b$(G
%,1),t$) flg=G%
 760 NEXT:IFflg=0 flg=discs% ELSEdiscs%
=discs%-1
 770 b$(flg,1)=t$:b$(flg,2)=STR$file%:P
ROCsvd
 780 d%=OPENUP f$:PTR#d%=alloc%*(flg-1)
 790 FORN%=1TOfile%:PRINT#d%,a$(N%)
 800 NEXT:CLOSE#d%:PRINT
 810 PROCspace("Data saved",VPOS)
 820 ENDPROC
 830 :
 840 DEF PROCscan
 850 PRINT"CHR$134"Enter the required
string, using usual"
 860 PRINTCHR$134"Dot notation (ie . be
tween directory"
 870 PRINTCHR$134"names and filenames)
if necessary."
 880 PRINT"CHR$134"Any occurence of the
 input string in"
 890 PRINTCHR$134"any disc files will b
e printed. For a"
 900 PRINTCHR$134"hard copy ensure the
printer toggle is"
 910 PRINTCHR$130"ON"CHR$134", the Prin
ter is connected and also"
```

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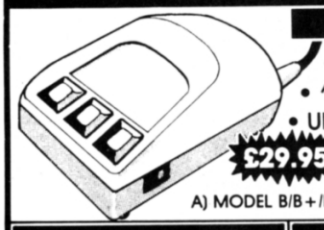

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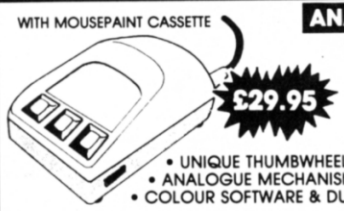

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jump	Display specified disc	**view**	Examine full disc data
off	Switch cursor off	**dtitle**	Get disc title
on	Switch cursor on		

◀ *From Page 26*

```
  920 PRINTCHR$134"switched on."
  930 PRINT"CHR$133">"CHR$131;
  940 PROCon:INPUTLINE""B$:PROCoff
  950 CLS:discs%=FNldd:disc=1
  960 REPEAT PROCreaddisc(disc)
  970 VDU3+ptr,14-ptr:PRINTCHR$129b$(dis
c,1)
  980 FORF%=1TOVALb$(disc,2):A$=a$(F%)
  990 IFINSTR(A$,B$)IFLEFT$(A$,3)="dir"P
RINTCHR$130MID$(A$,4)
 1000 IFINSTR(A$,B$)IFLEFT$(A$,3)<>"dir"
PRINTCHR$131A$
 1010 NEXT:PRINT:disc=disc+1
 1020 UNTILdisc=discs%:VDU3,15
 1030 PROCspace("",VPOS):ENDPROC
 1040 :
 1050 DEF PROCjump
 1060 discs%=FNldd:FORN%=1TOdiscs%-1
 1070 PRINTCHR$134N%TAB(6)CHR$131b$(N%,1
)TAB(27)CHR$130b$(N%,2)
 1080 NEXT:VDU15:x=POS:y=VPOS:REPEAT
 1090 PRINTTAB(x,y+1)CHR$130"Which disc
(1-";discs%-1") ?"CHR$134SPC18;
 1100 x1=POS-18:INPUTTAB(x1,y+1)""disc:U
NTILdisc>0 AND disc<discs%
 1110 PROCview(disc):ENDPROC
 1120 :
 1130 DEF PROCview(disc)
 1140 REPEAT:VDU28,0,24,39,3,12
 1150 PRINT"Disc: "b$(disc,1)
 1160 PROCreaddisc(disc)
 1170 PROCcn(CHR$129+"Use [ and ] to cha
nge current disc",21)
 1180 VDU28,0,22,39,5:co%=0
 1190 REPEAT FOR G%=1 TO 18
 1200 PRINTTAB(0,G%-1);
 1210 IFG%<=VALb$(disc,2) PROCprint(a$(G
%))
 1220 NEXT:REPEAT:REPEAT:*FX21
 1230 A%=GET:new=FALSE
 1240 UNTIL(A%>135ANDA%<140)ORA%=9
 1250 IF A%=138 PROCup
 1260 IF A%=139 PROCdown
 1270 IF A%=136 IF disc>1 disc=disc-1:ne
w=TRUE
 1280 IF A%=137 IF b$(disc+1,1)>"" disc=
disc+1:new=TRUE
 1290 UNTIL A%=9 OR new
 1300 UNTIL A%=9 OR A%=136 OR A%=137
 1310 UNTIL A%=9:ENDPROC
 1320 :
 1330 DEF PROCreaddisc(disc)
 1340 LOCAL d%,N%
 1350 d%=OPENINf$:IF d%=0 ENDPROC
 1360 PTR#d%=alloc%*(disc-1)
 1370 FORN%=1TOVALb$(disc,2)
 1380 INPUT#d%,a$(N%):NEXT
 1390 CLOSE#d%:ENDPROC
 1400 :
 1410 DEF PROCup:co%=co%+1
 1420 IFco%>VALb$(disc,2)-18:co%=VALb$(d
isc,2)-18:ENDPROC
 1430 VDU31,0,17,10:PROCprint(a$(co%+18)
):ENDPROC
 1440 :
 1450 DEF PROCdown:IFco%<1ENDPROC
 1460 VDU30,11:PROCprint(a$(co%))
 1470 co%=co%-1:IF co%<0 co%=1
 1480 ENDPROC
 1490 :
 1500 DEF PROCstar:PROCon
 1510 INPUT"*"os$:PROCos(os$):PRINT
 1520 PROCspace("",VPOS):PROCoff:ENDPROC
 1530 :
 1540 DEF PROCspace(t$,Y%):*FX21
 1550 IF t$>"" t$=t$+", "
 1560 PROCcn(t$+"press space",VPOS)
 1570 PROCon:REPEAT UNTIL GET=32
 1580 PROCoff:ENDPROC
 1590 :
 1600 DEF PROCprint($cli%):LOCAL B%,C%,D
%,E%:E%=cli%
 1610 B%=ASC".":FOR N%=0 TO LEN$cli%-1
 1620 IF cli%?N%=B% D%=D%+1:E%=N%+cli%+1
 1630 NEXT:C%=131+(LEFT$($cli%,3)="dir")
 1640 PRINTTAB(D%+2,VPOS)CHR$C%$E%;:ENDP
ROC
 1650 :
 1660 DEF FNdtitle:LOCALA%,X%,Y%,t$
 1670 A%=5:X%=blk%MOD256:Y%=blk%DIV256
 1680 blk%!1=buf%:blk%!5=18:CALLosgbpb
 1690 IF ?buf%=0 null=null+1:=null$+STR$
null
 1700 FORN%=1TO?buf%:t$=t$+CHR$(buf%?N%)
 1710 NEXT:=t$
 1720 :
 1730 DEF PROCcn(A$,Y%):PRINTTAB(18-LENA
$/2,Y%)A$;:ENDPROC
 1740 :
 1750 DEF PROCstore(A$):file%=file%+1
 1760 IF dir A$="dir$."+prf$+A$ ELSE A$=
"$."+prf$+A$
 1770 a$(file%)=A$:ENDPROC
 1780 :
 1790 DEF FNnospace(A$)=LEFT$(A$,INSTR(A
$," ")-1)
 1800 :
 1810 DEF FNldd:PROCos("MOUNT 0")
 1820 ch%=OPENIN"$.Discs":IFch%=0:CLOSE#
0:=1
 1830 co%=0:REPEAT:co%=co%+1
 1840 INPUT#ch%,b$(co%,1),b$(co%,2)
 1850 UNTILEOF#ch%:CLOSE#0:=co%+1
 1860 :
 1870 DEF PROCsvd:ch%=OPENOUT"$.Discs"
 1880 FORN%=1TOdiscs%:PRINT#ch%,b$(N%,1)
,b$(N%,2)
 1890 NEXT:CLOSE#0:ENDPROC
 1900 :
 1910 DEF PROCos($cli%):LOCALX%,Y%:X%=cl
i%
 1920 Y%=X%DIV256:CALLoscli:ENDPROC
 1930 :
 1940 DEF PROCend:&%=&A0A:*FX4
 1950 VDU3:CLS:PROCon:ENDPROC
 1960 :
 1970 DEF PROCon:VDU23,1,1;0;0;0;0;:ENDP
ROC
 1980 :
 1990 DEF PROCoff:VDU23,1,0;0;0;0;0;:END
PROC
 2000 :
 2010 DEF PROCinit:PROCoff:*FX4,1
 2020 DIM cli%256,blk%20,buf%40
 2030 I%=OPENIN"$.Config"
 2040 INPUT#I%,maxlen,alloc%,size%,f$
 2050 CLOSE#0:@%=&505:ptr=FALSE
 2060 null$="Unnamed ":null=0
 2070 DIMa$(1000),b$(size%,2)
 2080 db$=CHR$141+CHR$132+CHR$157+CHR$13
1
 2090 eb$=CHR$32+CHR$32+CHR$156
 2100 ban$="ADFS Disc Catalogue"
 2110 osargs=&FFDA:osfile=&FFDD
 2120 osgbpb=&FFD1:oscli=&FFF7
 2130 READ cmds%:DIM c$(cmds%)
 2140 FOR C%=1 TO cmds%:READ c$(C%)
 2150 NEXT:ENDPROC
 2160 :
 2170 DATA 7,Add a new disc
 2180 DATA Search discs,View discs
 2190 DATA Jump to specific disc
 2200 DATA Star Command,Printer,Exit
```

Get it right!

```
  10 = 0 0          320 = 3608 6
  20 = 0 0          330 = 9719 A
  30 = 0 0          340 = 16D1 4
  40 = 9719 9       350 = 47B6 6
  50 = 916A 0       360 = FA32 C
  60 = 91C6 E       370 = 9719 D
  70 = 376A 2       380 = B8D8 D
  80 = 9621 B       390 = 13B1 E
  90 =  4FB A       400 = 4413 C
 100 = 4B22 4       410 = E711 F
 110 = 2B46 E       420 = 2716 B
 120 = 4A08 6       430 = 56DC 0
 130 =   FC 3       440 = 5CA4 E
 140 = 15BC 5       450 = 906E A
 150 = D06D E       460 = EFCE 0
 160 = AA90 2       470 = 3273 B
 170 = 7FC4 9       480 = 9719 D
 180 = 2F12 F       490 = F407 9
 190 = DCA3 A       500 = 6FE9 0
 200 = 617F C       510 = 18A5 7
 210 = 7745 5       520 = FE4B 7
 220 = 6FDB 8       530 = 37EA D
 230 = 6D75 D       540 = 1470 9
 240 = AFDB C       550 = 9719 E
 250 = E2BE 2       560 = 2375 2
 260 = 8B24 D       570 = 6E5D F
 270 = 9719 C       580 = 5D16 A
 280 =  71C 3       590 = 325D 6
 290 = FEEE F       600 = EEEE A
 300 = CDDF 0       610 = F379 0
 310 = 7B51 B       620 = 4075 8
```

Turn to Page 30 ▶

FEATURE

VARIABLES

disc	Current disc number
ptr	Printer active flag
t	Current indent
alloc%	Space allocated for each catalogue
buf%	File name buffer
ch%	File handle
cmds%	Number of menu options
size%	Number of discs that can be stored
a$()	Current disc file and directory names
b$()	List of discs available
c$()	List of menu options

Get it right!

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```
630 = 2BAB F
640 = BF23 D
650 = 9719 3
660 = 52FF 9
670 = 1180 1
680 = C3A4 0
690 = 297F 0
700 = 51BC 4
710 = 241E 3
720 = A09F 7
730 = F53F 5
740 = 5428 8
750 = A67D F
760 = 6275 2
770 = F9B3 8
780 = E0F5 6
790 = 8401 2
800 = 6DDB D
810 = 3473 5
820 = ED0F 0
830 = 9719 2
840 = 4B58 8
850 = 4CBB 0
860 = 649C C
870 = C6FC D
880 = 67D4 4
890 = 6E8F 0
900 = AB39 C
910 = EA87 A
920 = 65B2 7
930 = E64F 4
940 = 115A B
950 = A356 3
960 = 4606 C
970 = 69AD 7
980 = 4CBC 5
990 = 635B 8
1000 = 7BE2 C
1010 = CC29 D
1020 = D283 9
1030 = 4F60 A
1040 = 9719 A
1050 = E4D9 0
1060 = CFE6 9
1070 = 3753 6
1080 = AEA1 3
1090 = 9847 2
1100 = E7F1 A
1110 = F853 C
1120 = 9719 F
1130 = E8C0 0
1140 = 5984 D
1150 = 8088 3
1160 = F977 7
1170 = 5D7E 1
1180 = 6856 D
1190 = A3A0 4
1200 = 3032 2
1210 = 726 6
1220 = 8B9E C
1230 = 50CA B
1240 = CF40 F
1250 = 5BA3 B
1260 = F14A 6
1270 = 129F 7
1280 = CFCE A
1290 = EDA1 4
1300 = 8C5 7
1310 = 3846 A
1320 = 9719 F
1330 = FD14 A
1340 = 6CD7 2
1350 = FD8C 5
1360 = E87 9
1370 = C677 6
1380 = 2254 F
1390 = F374 4
1400 = 9719 E
1410 = F509 E
1420 = 5D57 F
1430 = DAA 8
1440 = 9719 1
1450 = A900 9
1460 = 81A7 D
1470 = 117B 3
1480 = ED0F 2
1490 = 9719 A
1500 = 79AE 0
1510 = 46D2 3
1520 = D5D3 D
1530 = 9719 B
1540 = 29A5 1
1550 = 747D 4
1560 = 9DEA 0
1570 = F80 3
1580 = 3608 C
1590 = 9719 E
1600 = C9F7 0
1610 = 5CA8 4
1620 = A2DA 5
1630 = DA30 B
1640 = 4085 8
1650 = 9719 1
1660 = 17CD 3
1670 = 5D16 A
1680 = F363 D
1690 = 3284 F
1700 = 24E3 9
1710 = 79BB 5
1720 = 9719 E
1730 = 9A12 F
1740 = 9719 A
1750 = 4FF4 5
1760 = AEA7 8
1770 = 6BFD 8
1780 = 9719 C
1790 = A0C2 A
1800 = 9719 F
1810 = ACAA 4
1820 = 5125 A
1830 = B926 5
1840 = 5EAA 8
1850 = BD15 7
1860 = 9719 E
1870 = 5196 A
1880 = A366 A
1890 = AA9F A
1900 = 9719 3
1910 = 5535 C
1920 = 983C 2
1930 = 9719 D
1940 = E411 5
1950 = 2569 4
1960 = 9719 6
1970 = 740 6
1980 = 9719 B
1990 = CCEB B
2000 = 9719 2
2010 = 41BE C
2020 = 2511 E
2030 = DDFA C
2040 = 4982 C
2050 = 791 E
2060 = 65F9 0
2070 = E563 0
2080 = AB9B 1
2090 = 319 B
2100 = C5F7 1
2110 = 5BDE D
2120 = 100 F
2130 = A302 5
2140 = 109D 3
2150 = E531 6
2160 = 9719 F
2170 = 8197 F
2180 = 321E 8
2190 = 7541 7
2200 = 1EC B
```


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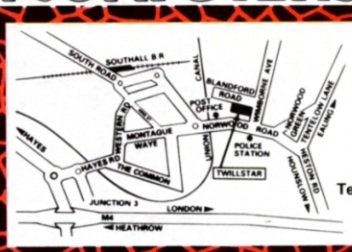

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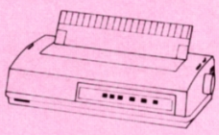

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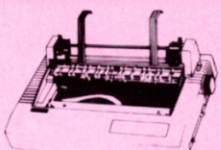

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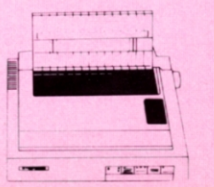

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Your technical questions answered by MIKE COOK

PROBLEM SOLVED

Sound samples

CAN sampled sounds be replayed on a BBC Micro without a sampler fitted like the one described in the January 1986 issue of *The Micro User*. Also, can you still supply the PCB layout diagram for the project? – **Mark Smith, via Prestel.**

● *Sound samples can't usually be played on micros that don't have a system fitted. However a technique for doing this was printed in the December 1986 issue of* The Micro User. *Naturally the quality of sound is not nearly as good as when using a sampler. PCB layouts for this project are available on request from Musbury Consultants – enclose an sae.*

Mouse plots

CAN a Philips X,Y Recorder be used on a BBC B, and if so what would be needed to drive it from an AMX mouse? – **N.D. Salisbury, Broadsands, Paignton.**

● *AS far as I know the PM8041 X,Y Recorder is designed to accept analogue voltages, so to drive it from a digital micro you need to build two digital to analogue converters. These will control the precision of the plotted results so they need to be 10 bits to work in the screen coordinate system. With more bits the results would be smoother.*

You would also need some sort of digital output – probably from the user port – to lift and lower the pen. The software needs to be able to intercept the graphics VDU calls and send the coordinates to the D/A converters to give you a screen dump as the screen is being drawn. However, remember that a plotter – unlike a screen – can't remove points it has plotted, so the best results would be obtained by writing software specifically for it.

Interfacing a plotter

I WISH to make an interface lead for my Commodore 1520 printer plotter so that I can use it on my BBC B. Please could you tell me which connections I need to make so that I can connect it to the serial port? – **Adam Hill, Denby Village, Derbyshire.**

● *Unfortunately Commodore uses a totally non-standard system to communicate with peripherals.*

While in theory it should be possible to make a device to attach to the 1MHz bus and write a sideways rom to handle communications, to my knowledge no one has thought it worth while. It's what I call a non-trivial project.

Upgrading to disc

I HAVE a BBC B with no expansions and I would like to upgrade it for disc use. Would the 1770 Disc Interface work, and can it use a normal DFS chip? – **Richard Abbott, Goldalming, Surrey.**

● *You can't just fit a 1770 chip into a model B – you need an interface board and software to drive it – a standard DFS will not do. However, several advertisers in* The Micro User *sell complete disc upgrade kits.*

Technology project

I AM doing GCSE Technology and my chosen project is to build a digitiser. I buy *The Micro User* regularly and would like to know if a section on digitisers has been included in the Body Building series. If so this would help me with my research? – **George Erle, Tollesbury, Essex.**

● *You do not say what type of digitiser you want. Many have been covered in the Body Building course: High speed D/A in March 1984, a digital voltmeter in April 1985, a sound sampler in January 1986, an 8 channel D/A in February 1987 and a video digitiser in May 1987.*

System incompatibility

I HAVE an Issue 4 BBC B 1.2 O.S., Basic II, fitted with a Watford rom/ram board and UDM 3.1 DDFS. Everything has been working perfectly for a very long time with the unsurprising exception that a few programs are in some way incompatible with the set-up.

Recently I decided to buy a Watford MK II Double Density DFS Interface, and immediately ran into trouble. On entering *FORM80 0 I answered all the prescribed questions but no formatting took place. The disc light came on for a few seconds, 00 appeared on the screen and

Turn to Page 34 ▶

On the agenda...

- **Micro sampled sounds**
- **Plotting with a mouse**
- **Interfacing a plotter**
- **Installing a 1770 DFS**
- **Digitisers for GCSE course**
- **Micro robotic control**
- **Corruption from loose connections**
- **DFS upgrade differences**

◀ *From Page 33*

the computer hung up.

The kit's installation was checked by three different BBC Micro enthusiasts and could not be faulted. Moreover the same Watford DDFS was installed in two other similar BBC Micros and it worked perfectly.

I then tried a local dealer who sells Solidisk 1770 DFS and again the DFS would not work on my micro despite repeated attempts. In both instances all the irrelevent sideways roms were removed from the micro to avoid any possible interaction.

I would be grateful for any assistance you could give in this matter. I shall always stick to your motto: *Be surprised when it works not angry when it doesn't.* – **Dr. Philip Micallef, Balzan, Malta.**

● *As the hardware works on other micros it is clearly yours that is to blame for the faults. Without proper examination with test equipment it is impossible to be absolutely sure of the cause but to track things down you could ask the following questions.*

When fitting the UDM DDFS was any modification done to the micro's board? If so, have you undone it? Has the disc controller chip socket been damaged by the earlier DDFS installation? Are there some components on the board that were used by the previous system but are not needed by these new systems, or visa versa?

If you can get hold of an original Acorn DFS system with the 8271 chip, fit it and try to get it working: This will be the easiest configuration to find your fault as it minimises the number of components in the disc system.

Basic corruption

I HAVE a BBC B and over the past year virtually all my Basic programs have suffered some form of random memory corruption. Generally single bytes of information alter in mid-run, either producing blots of odd-coloured pixels on the screen or causing the program to crash.

I think that my Watford rom/ram board with 64k ram is the cause of the problem, but when I asked Watford to examine it they told me that there was nothing wrong with it. However the micro has never crashed when the board was out, and had never crashed before I got it. – **David Trounce, Wildwoord, Stafford.**

● *Your problem is quite simple – intermittent connection. This is why examination of the offending modules fails to produce any sign of error. However, for such a simple problem the solution could be a little tricky. In any computer system the weakest link is normally the plugs and sockets: I would replace the sockets where the*

extra board plugs in. This is quite a skilled job and I would recommend you to find an experienced repair company.

But if you want to have a go yourself get a pair of sharp side cutters and cut up the plastic from the socket into small pieces. Then gently pull the plastic away leaving the individual sockets. One by one unsolder each and finally use a solder sucker to clear the holes.

I had a similar problem on my machine. It turned out to be the CPU socket, but I only found this out after replacing all the sideways rom and system VIA sockets.

Adjusting the volume

WOULD it be possible to connect a variable resistor in series with the speaker of a BBC Micro to adjust the volume? Also, can I take the output from the micro to the speaker in parallel and record it on to a cassette? – **N. Fawcett, Kent.**

● *A simple variable resistor in series with your speaker lead will reduce the volume – I found that a 1K variable was adequate. However a better solution is to use the volume control on the micro board. This is a blue block with a screw adjuster located in the left hand corner. You could adjust this or remove it and replace it with a variable 10K resistor fitted with a knob.*

Soundmaster, available from Database Electronics, allows you to connect headphones to your micro and adjust the volume of those or the internal speaker.

There is no problem feeding the signal from Soundmaster or from the speaker into a tape recorder's input.

Robotic control

AT my school I am looked upon as a reasonably good programmer and have carried out a few programming tasks which I have been asked to do – but now I am stumped.

I've been asked to write a program to control the movement of a robotic arm which plugs into the 1MHz bus. I was wondering if you could possibly supply me with a listing to do this. – **N.P.J. Davey, Westbury, Wilts.**

● *The 1MHz bus appears to the micro just like 512 bytes of memory – from &FC00 to &FDFF. So anything plugged into it has to be configured to look like memory locations to the micro. To control a robot arm you will need some type of output interface like the user port expansion project in the August 1984 issue of* The Micro User. *Without a knowledge of what interface you have and what motors you have wired it up to, your request for a full listing is simply impossible.*

Have you any hardware problems with your BBC Micro? If so, write to Mike Cook, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP, giving full details of your system and the problem.

Unfortunately, Mike cannot send you personal replies, but as many questions as possible will be answered on the pages of The Micro User.

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R157

Do it with Style

Peter Davidson shows how you can give your letters the professional look

FONTSTYLE, the Database Publications font designer/printing package, has many applications for high quality printing, but one useful one is producing your own letterheads. Over the next two months we're going to show you how you can produce professional-looking letters quickly and with very little expense.

This month we'll look at letterheads like the Database one shown in Figure I and next month we'll supply a designer so you can produce graphic ones like those in Figure II.

I'll be using the disc version of the package, but tape users can easily adapt the methods given. First, you must make a backup of your FontStyle disc so you don't change files on your master – instructions on how to do this are in the manual.

Boot the disc and select designer to create any special characters you require – in the case of the Database paper I designed the lines that go across the page. You could also use, say, four characters and print them together to form a logo.

When you create your own characters for headings it's best to alter rarely-used ones of a similar shape to what you need – for example * can easily be changed to ●. In the case of my heading I just extended the length and width of – to give a section of a line. Once you've designed all the special characters save it as HEDFONT.

You can then wipe the designer from your disc, together with any unused fonts – I wiped OLDE and BOLD because the only font I use on the letterheads is HEDFONT. The program FONTPRT must be modified to default to HEDFONT, as OLDE is no longer on the disc. So load it and change the default font, which you'll find in all versions of the program around line 470, to HEDFONT. Then resave FONTPRT.

The next job is to design the actual letterhead. It's a matter of trial and error to get perfection, so make your first attempt – using any word processor – and save it in Ascii or spooled form as HEAD – the file that prints the Database paper is shown in Figure III.

```
<CE5><DH><EX2>--------------------
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--------------------
<NH><EX1>Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP

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  Fax: 0625 879966                                            Prestel
614568383
```

Figure III: The file that creates the Database heading

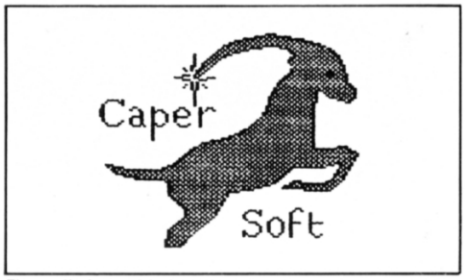

Figure II: A graphic heading

To save you typing lots of commands each time you want to view your design you can build a new boot file to give the effect of printing directly from your word processor. Enter *BUILD !BOOT and enter the following:

```
*BASIC
CH."FONTPRT"
RPHEAD
```

Press Escape to close the file. Now pressing

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Figure I: The Database letter heading

FontStyle

◀ *From Page 37*

Shift+Break – even while your word processor is still on your screen – will return you to Basic, run the font printer, select draft printing mode for speed (R), choose the print option (P) and automatically enter the filename HEAD. Once printed, check what modifications you need, make them using your word processor, save a new HEAD and press Shift+Break again to see the results.

Keep repeating the process until you are satisfied with the results, and then re-build the boot file, but this time without the R so draft mode isn't selected. It's a good idea to compact the disc at this stage.

You can now proceed in one of two ways. Firstly, you can output the complete letter using the high-quality FontStyle typefaces. To do this *RENAME HEAD as HEADER and load it into your word processor. Type in your letter after it using the embedded commands described in the FontStyle manual and save it – Ascii – as HEAD. Press Shift+Break to print the letter.

I prefer the second method, which is to use the printer's NLQ for the bulk of the letter. This has the advantage of making the letterhead stand out more; also the letter prints faster. This is how you do it:

Load HEAD and add one extra line to make it print your letter file automatically:

```
<GF LETTER>
```

Re-save HEAD, then create a dummy file by entering:

```
*SAVE LETTER 1900 8000
```

This will ensure you never encounter the dreaded *Can't extend* error.

Now all you have to do is type your letter in the usual way but without any heading, save it – using any filename you want – as a file for your word processor in case you ever want to modify it and save it again as an Ascii file called LETTER.

Now, booting the disc will automatically load the FontStyle printing program, enter the commands to print HEAD and, as this contains a *Get File* command, LETTER is printed.

So that's how you can quickly and easily give your letters a professional look. Next month we'll give you a utility to enable you to produce your own graphic letterheads.

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Archimedes overhauls Master

THERE were smiles and glum faces when representatives of Cornish Schools attended a special presentation of Acorn-related technology. Acorn's Gareth Williams was one of those with a broad grin. "Education authorities are now placing orders for the Archimedes in terms of many hundreds of machines per authority", he told his audience.

"In June sales of the Archimedes exceeded those of the BBC Master for the first time – and that was not in the least because Master sales are declining. Interest in that computer is as steady as ever".

One presentation that attracted many science teachers was that of Spacetech demonstrating its weather satellite image decoding package for the Archimedes.

Spacetech is confident that the pictures produced by its Archimedes expansion card are the best that it is possible to get from weather satellite analogue transmissions. The complete package is cheaper than anything at present available for other comparable computers in education.

Glum faces were worn by some visiting teachers who had succumbed to pressure from local advisers to purchase RM Nimbus computers for their schools, and who were now being made only too well aware of what they were missing as a result.

Astounded, for example, at the potential shown by Clare's Artisan package – which outpaces anything the Nimbus can manage – the glum faces stemmed from the realisation that, until funds were available to purchase Archimedes micros, their schools were going to be left far behind.

Local clergyman and primary school governor, the Rev Bob Redrup said: "It's a crying shame that many Cornish schools seem to have been wrongly advised – and by those who are supposed to be experts – to adopt an increasingly obsolescent and, compared with the Archimedes, definitely limited micro.

"Risc technology is the way ahead and these folk have, in my opinion, been led up a blind alley".

Winning slogan

BUDDING advertising executive Ian Pumfrey, a 10-year-old pupil at a Colchester primary school, won Acorn's find a slogan competition. The contest was organised by the Chappel Conservation Volunteers as part of this year's Colchester Festival of the Natural World in connection with the European Year of the Environment.

Ian's winning slogan – A little Acorn today, a great oak tomorrow – was chosen from entries submitted by schools throughout Colchester. The contest also involved distribution among local children of 2,000 acorn planting packs.

Mathematics and the micro

LOCAL education authorities have been selected to take part in the MESU project Computers in the Secondary Mathematics Classroom. They are Bedfordshire and Cambridgeshire, Dudley, Ealing, Hillingdon, Hounslow, Kingston and Richmond, Hampshire, and Wakefield.

Teachers from the LEAs, which have been split into five local groups, will be released from work one day a week during the next school year.

Each group will be coordinated by an advisory teacher, and the project will be monitored nationally. At the end of the project MESU will produce case studies of work in the classroom and other materials for teachers.

Investigating

Teachers from Oldham, Lancashire County and Bristol have begun a project to discover ways in which computers and peripherals can help children with severe learning difficulties. The focus is on useful and meaningful mathematical experiences.

Areas within the broad mathematical themes of the MESU primary resource packs Different Starting Points and Again and Again are being explored. Some of the teachers have been using video in their classrooms and the tapes may be edited later for distribution to other schools.

Powerful argument

MINERVA Systems (0392 37756) organised two open days in July to demonstrate the Archimedes' power and speed to teachers.

Education representatives from the Plymouth area saw a school administration package in action completing a Form 7 – required statistics for the DES.

Music applications from Electro Music Research and plotter applications from Linear Graphics were also demonstrated.

More on SEND

THERE are now more than 3,000 pages on the Special Education Needs Database – Prestel page 515 – according to coordinator Mick Thomas. "There has been a large increase in the number of users of SEND", he said. "With the recent initiative by the DTI to supply major funding for telephone lines to access remote databases, special schools can now take advantage of SEND".

Courses

ONE week courses in mathematics education and information technology will be held under the MESU project between December and July.

They will be for mathematics advisers, advisory teachers, and pre-service educators and each will have a two-day follow-up some months later.

The courses are likely to be held in London, Cirencester, Cambridge, Coventry, Liverpool and Harrogate.

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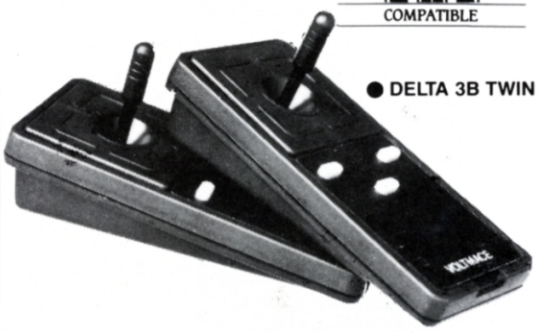
Archimedes COMPATIBLE

COMPATIBLE



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FOR A BBC A, B, B+, MASTER, ARCHIMEDES & ELECTRON PLUS 1

DELTA 3B TWIN – £21.95

2 joysticks wired to one plug.
As with all our joysticks they have the fast action sprung to centre return of the steel shafted nylon covered joystick. The light action makes them ideal to hold and the 3 fire buttons allow left or right-handed use.

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A single joystick that in some ways can act as two. The custom made potentiometers are wired so that it will work as a left hand or right hand joystick. It can run some programs written for two joysticks and has two independant fire functions.

DELTA 14B AVAILABLE FOR BBC A, B, B+ & MASTER £16.95

Our original ACORN/BBC handset. The same super light joystick, but with 14 long life buttons, video game tested for many years. A DELTA14B/1 is needed to run the keypad but a 14B on it's own will work as a joystick and fire buttons, so you can always add the 14B/1 to it later.

DELTA 14B/1 for use with 1 or 2 DELTA 14B's £16.95
DELTA DRIVER CASSETTE, AD OR DISK

The A/D/USER PORT interface box. This gives simultaneous access to both the analogue port, for the joystick part and the user port, for the keypad. Two handsets can be plugged into the box giving a total of 24 user definable keys.
N.B. On a Master a small extension lead is needed to clear the RGB socket (£5.95 extra).
Full instructions are provided to include the keypad in your own programs even in BASIC or for the non-programmer a DELTA DRIVER cassette is available with keyboard to joystick/keypad conversions and keypad set up programs.

FOR THE MASTER COMPACT OR ELECTRON FITTED WITH A SWITCHED JOYSTICK INTERFACE

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For an ELECTRON with a switched joystick interface (not a PLUS 1) this gives you the same delightful light, fast action of the DELTA joysticks but fitted with a 9 way D plug as per Atari, Commodore, etc. and will run on First Byte interface or similar.

DISCOFLEX AND ISODATA COMPUTER CONTROLLED DISCO LIGHTS

3 coloured 3" reflector bulbs in a 16" high, 5" wide steel case, with individual level controls.
The Isodata 6 unit plugs into the user port and connects to 1 or 2 Discoflex lamp units, allowing simple software control of 6 lamps opto-isolated from the computer.
If you do not want to control the lights from the computer, switch them to auto-mode and they will react to the sound of music.

Discoflex 3 lamp unit £29.95
Isodata 6 opto-isolator £19.95

Compact COMPATIBLE

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SPECIAL TEAC DISC DRIVES

Sometimes referred to as the Rolls Royce of Disc Drives, these are available in all our usual forms

Bare Drives £75.00
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10 5.25" 40Tr Double sided £4.95
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DATAPAD 16B £39.95

A commercial spec. 16 way keypad. Full travel mechanical keys with double shot moulded keycaps mounted in a low profile metal case. The keys are marked with calculator legend, but the software included allows the pad to be defined as any keys, including function keys or single byte VDU commands such as PRINTER ON/OFF. No tampering with the computer as it fits onto the user port.

Access

All prices include VAT + P&P
Joysticks are available from your dealer or direct from us on (0462) 894410
Special offers only available direct

VISA

Unit 9, Bondor Business Centre, London Road, Baldock, Herts. SG7 6NG. Telephone (0462) 894410

Your education in the balance

Jon Perry and Pali Rao show how your micro can have its moment

HERE'S a program to help you to understand balances – the principle of moments. It's ideal for use in schools or at home for learning or revision. Type in the program, check it with Get it Right! and save it. When you run it you are asked for a difficulty level from one to three. You can use T to toggle the timer on and off and sound can be switched on or off using S.

The micro will then display a balance bar with the appropriate number of masses on the right hand side. Each weight, represented by a quarter of a circle, is drawn in red. You then have to balance the bar by moving the pointer – using Z and X – over the desired position and pressing the spacebar to add weights. When you think the balance would remain level, press Return.

If you are right you get a large tick, while you will be rebuked by a large cross for wrong answers. This continues until you get it right. Note that an exact duplication of the other side will not be accepted.

	ROUTINES
addweight	Put another weight on bar
bar	Draw the bar at an angle
box	Draw a box
circle	Draw a circle segment
coff	Switch cursor off
con	Switch cursor on
counters	Draw weights on bar
db	Print double height characters
game	Main playing routine
head	Draw program header
init	Initialise main variables
initgame	Initialise for new game
level	Get game level and set flags
movearrow	Move the pointer over bar
right	Put a tick on screen
screen	Draw the main playing screen
showtime	Show the time taken to play
tune	Play the tune
wait	Delay for a while
wrong	Put a cross on screen
Lmoment	Calculate moment of player's side
Rmoment	Calculate moment of micro's side
get	Get a key with or without double height prompt
same	Calculate if moments are the same

```
   10 REM Balance
   20 REM by Jon Perry & Pali Rao
   30 REM (c) The Micro User
   40 ONERROR MODE7:PROCerror:END
   50 MODE7:PROCcoff:PROCinit
   60 REPEAT
   70 PROClevel
   80 MODE5:PROCcoff
   90 VDU19,2,4;0;:CLS
  100 PROCinitgame(Level%)
  110 REPEAT
  120 PROCgame
  130 UNTIL moment%=Moment%
  140 PROCwait(3):CLS:PROChead(864)
  150 PROCbox(8,8,1210,992)
  160 PROCbox(112,724,1096,776):COLOUR1
  170 PRINTTAB(2,8)"You've done it!"
  180 PROChead(544):PROCbox(240,404,968,
456)
  190 PRINTTAB(4,18)"Attempts ";go
  200 IF Timer% PROCshowtime
  210 IF Noise% PROCtune ELSE PROCwait(1
)
  220 PROCwait(1):MODE7:PROCcoff
  230 PROCdb(1,0,10,"Another go? (Y/N)")
  240 A%=FNget("YN",19,10,4,TRUE)
  250 CLS:UNTIL A%=2:PROCcon:*FX12
  260 PRINT"Bye bye....":END
  270 DEFPROCcoff
  280 VDU23,1,0;0;0;0;:ENDPROC
  290 DEFPROCcon
  300 VDU23,1,1;0;0;0;:ENDPROC
  310 DEFPROCshowtime
  320 PROChead(224):PROCbox(176,84,1032,
136)
  330 PRINTTAB(3,28)"Time ";time%DIV100"
 secs"
  340 ENDPROC
  350 DEFPROClevel
  360 PROCdb(1,12,1,"B A L A N C E")
  370 PROCdb(3,11,3,"_____")
  380 PROCdb(5,2,6,"Level 1 : One positi
on")
  390 PROCdb(5,2,9,"Level 2 : Two positi
ons")
  400 PROCdb(5,2,12,"Level 3 : Three pos
itions")
  410 PROCdb(6,0,15,"Enter level")
  420 PROCdb(2,12,19,"Timer")
  430 PROCdb(2,12,22,"Sound"):G%=0
  440 REPEAT
  450 IF G%=4 Timer%=NOT Timer%
  460 IF G%=5 Noise%=NOT Noise%
  470 IF Timer% T$="ON " ELSE T$="OFF"
  480 IF Noise% S$="ON " ELSE S$="OFF"
  490 PROCdb(3,19,19,T$)
  500 PROCdb(3,19,22,S$)
  510 G%=FNget("123TS",13,15,4,TRUE)
  520 UNTIL G%<4:Level%=G%-1
  530 ENDPROC
  540 DEFPROCdb(C%,X%,Y%,m$):LOCALD%
  550 FOR D%=Y% TO Y%+1:VDU31X%D%141
  560 PRINTCHR$(128+C%)m$;:NEXT:ENDPROC
  570 DEFPROCinit
  580 VDU23,224,60,60,60,60,60,126,60,24
  590 ENVELOPE1,3,0,0,0,0,0,0,8,-1,0,-6,
124,60
  600 ENVELOPE2,1,0,0,0,0,0,0,32,-4,-4,-
8,110,60
  610 ENVELOPE3,1,0,0,0,0,0,0,126,-3,-3,
-6,126,100
  620 d=100:Moment%=0:moment%=0
  630 DIM s(20),c(20):*FX11,30
  640 DIM pos(4),plp(4),R%(4)
  650 FORT%=0TO20:s(T%)=SINRAD(T%*18)
  660 c(T%)=COSRAD(T%*18):NEXT:*FX12,30
  670 Timer%=FALSE:Noise%=TRUE:ENDPROC
  680 DEFPROCscreen
  690 CLS:PROCbox(8,8,1272,992)
  700 MOVE100,608:DRAW1180,608
  710 IF Timer% PROCbox(376,120,896,168)
:COLOUR2:PRINTTAB(6,27)"Time ";:COLOUR3
  720 PROChead(864):PROCbar(0,FALSE)
  730 aX%=312:aY%=560:ENDPROC
  740 DEFPROCbox(Lx%,Ly%,Ux%,Uy%)
```

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```
  750 MOVELx%,Ly%:DRAWLx%,Uy%:
  760 DRAWUx%,Uy%:DRAWUx%,Ly%
  770 DRAWLx%,Ly%:ENDPROC
  780 DEFPROChead(H%):GCOL0,1
  790 MOVE608,H%:MOVE672,H%
  800 PLOT85,640,H%+44:GCOL0,2
  810 MOVE500,H%+52:DRAW780,H%+52:VDU5
  820 GCOL0,3:PROCcoff:MOVE416,H%+92
  830 PRINT"BALANCE":VDU4:PROCcoff
  840 GCOL0,2:ENDPROC
  850 DEFPROCbar(Th,C%)
  860 GCOL0,1:MOVE500,200:MOVE780,200
  870 PLOT85,640,392:GCOL 0,2
  880 S=SINRADTh:C=COSRADTh
  890 x%=600*C:y%=600*S
  900 MOVE640-x%,500-y%
  910 MOVE640+x%,500+y%
  920 PLOT85,640-x%+d*S,500-y%-d*C
  930 PLOT85,640+x%+d*S,500+y%-d*C
  940 IF C% ENDPROC
  950 H%=6:GCOL0,3:VDU5:PROCcoff
  960 FOR J%=-540 TO 540 STEP 120
  970 IF J%<0 H%=H%-1 ELSEIF J%>60 H%=H%
+1
  980 MOVE640+J%,600:DRAW640+J%,616
  990 MOVE608+J%,648:PRINT;H%
 1000 PROCcircle(640+J%*C+d*S/2,500+J%*S
-d*C/2,40,0,20,0)
 1010 NEXT:VDU4:PROCcoff:ENDPROC
 1020 DEFPROCcircle(X%,Y%,R%,S%,E%,N%)
 1030 ox%=X%:oy%=Y%:MOVE X%,Y%
 1040 FOR T%=S% TO E%:MOVE ox%,oy%
 1050 IF N% IF Noise% SOUND1,1,T%*4,1
 1060 PLOT85,X%+R%*s(T%),Y%+R%*c(T%)
 1070 NEXT:ENDPROC
 1080 DEFPROCinitgame(L%):LOCAL G%,R%
 1090 FOR G%=0 TO 4:plp(G%)=0
 1100 pos(G%)=0:NEXT:go=0:time%=0
 1110 R%(0)=RND(5)-1
 1120 IF L%>0 REPEAT R%(1)=RND(5)-1:UNTI
L R%(1)<>R%(0)
 1130 IF L%>1 REPEAT R%(2)=RND(5)-1:UNTI
L R%(2)<>R%(0) AND R%(2)<>R%(1)
 1140 FOR R%=0 TO L%
 1150 pos(R%(R%))=RND(4):NEXT
 1160 IF L%=0:IF pos(0)=1:REPEAT pos(0)=
RND(4):UNTIL pos(0)=1
 1170 ENDPROC
 1180 DEFPROCcounters:LOCAL M%
 1190 GCOL0,1:FOR M%=0 TO 4
 1200 IFpos(M%)>0:PROCcircle(700+M%*120,
450,40,0,pos(M%)*5,0)
 1210 IFplp(M%)>0:PROCcircle(100+(4-M%)*
120,450,40,0,plp(M%)*5,0)
 1220 NEXT:ENDPROC
 1230 DEFPROCgame
 1240 PROCscreen
 1250 Moment%=FNRmoment
 1260 PROCcounters
 1270 VDU5:PROCcoff
 1280 go=go+1:TIME=time%
 1290 REPEAT REPEAT
 1300 GCOL0,1:MOVE aX%,aY%:VDU224
 1310 I%=FNget("ZX "+CHR$13,0,0,0,0)
 1320 IF I%<3 PROCmovearrow
 1330 IF I%=3 PROCaddweight
 1340 moment%=FNLmoment
 1350 UNTIL I%=4:same%=FNsame
 1360 IF same% SOUND1,-15,100,4
 1370 UNTIL NOT same%:time%=TIME
 1380 CLS:PROChead(864):GCOL 0,2
 1390 PROCbar((moment%-Moment%)/2,TRUE)
 1400 PROCwait(1)
 1410 IF moment%<>Moment% PROCwrong ELSE
PROCright
 1420 PROCwait(1):ENDPROC
 1430 DEF FNsame:LOCAL C%,F%
 1440 F%=TRUE:FOR C%=0 TO 4
 1450 F%=F%AND(plp(C%)=pos(C%))
 1460 NEXT:=F%
 1470 DEFPROCwrong:GCOL0,3
 1480 IF Noise% SOUND1,2,80,4
 1490 MOVE256,0:MOVE128,128
 1500 PLOT85,1152,896:PLOT85,1024,1024
 1510 MOVE1024,0:MOVE1152,128
 1520 PLOT85,128,896:PLOT85,256,1024
 1530 IF Noise% SOUND1,2,60,4
 1540 ENDPROC
 1550 DEFPROCright:GCOL0,3
 1560 IF Noise% SOUND1,3,100,4
 1570 MOVE128,320:MOVE384,64
 1580 PLOT85,256,448:PLOT85,512,192
 1590 MOVE384,320:PLOT85,1152,832
 1600 PLOT85,1024,960
 1610 IF Noise% SOUND1,3,120,4
 1620 ENDPROC
 1630 DEFPROCtune:LOCAL A%,T%,N%,D%
 1640 FOR T%=1 TO 16:READ N%,D%
 1650 IF N%=0 A%=0 ELSE A%=1
 1660 SOUND1,A%,N%,D%:SOUND2,A%,N%+1,D%
 1670 NEXT:ENDPROC
 1680 DATA61,4,77,4,113,4,109,36,61,4,81
,4,113,4,109,16
 1690 DATA0,4,93,4,101,4,0,2,65,2,61,2,5
3,2,61,2
 1700 DEFPROCerror
 1710 REPORT:PRINT" at line ";ERL
 1720 ENDPROC
 1730 DEFPROCwait(t):t=TIME+t*100
 1740 REPEATUNTILTIME>t:ENDPROC
 1750 DEF FNget(k$,X%,Y%,C%,F%)
 1760 LOCAL G%,I%:PROCcoff:REPEAT
 1770 IF F% PROCdb(C%,X%,Y%,"*")
 1780 IF NOTF% IF Timer% VDU4:PROCcoff:P
RINTTAB(11,27);TIME DIV100;:VDU5:PROCcof
f
 1790 G%=INKEY0:IF G%>96 IF G%<123 G%=G%
-32
 1800 I%=INSTR(k$,CHR$G%)
 1810 IF F% PROCdb(C%,X%,Y%," ")
 1820 UNTIL I%>0:=I%
 1830 DEFFNRmoment:LOCAL M%,L%
 1840 FOR L%=1 TO 5:M%=M%+L%*pos(L%-1)
 1850 NEXT:=M%
 1860 DEFFNLmoment:LOCAL M%,L%
 1870 FOR L%=1 TO 5:M%=M%+L%*plp(L%-1)
 1880 NEXT:=M%
 1890 DEFPROCmovearrow
 1900 GCOL0,0:MOVE aX%,aY%:VDU224
 1910 IF I%=1 IF aX%>100 aX%=aX%-120
 1920 IF I%=2 IF aX%<500 aX%=aX%+120
 1930 ENDPROC
 1940 DEF PROCaddweight
 1950 LOCAL C%:C%=plp((552-aX%)/120)
 1960 IF C%<5 C%=C%+1:IF C%>4 C%=0
 1970 IF C%>0:PROCcircle(aX%+28,450,40,(
C%-1)*5,C%*5,-1)
 1980 IF C%=0 GCOL0,3:PROCcircle(aX%+28,
450,40,0,20,-1)
 1990 plp((552-aX%)/120)=C%:ENDPROC
```

LINE	CHSUM	LINE	CHSUM
10 =	0 0	380 =	606A 0
20 =	0 0	390 =	E20F 6
30 =	0 0	400 =	FCD7 5
40 =	3E2D D	410 =	480C F
50 =	52FB 3	420 =	8B4A 3
60 =	BFBA D	430 =	27CE B
70 =	5EC1 2	440 =	BFBA 8
80 =	8C5F E	450 =	2D3D 0
90 =	2FB 4	460 =	A738 2
100 =	5CDC 9	470 =	7177 C
110 =	BFBA 4	480 =	13F3 2
120 =	9E04 4	490 =	DFD 9
130 =	7E12 1	500 =	AA72 8
140 =	8C3E 9	510 =	AF41 2
150 =	9723 A	520 =	190E 4
160 =	5AE3 C	530 =	ED0F F
170 =	F0F0 6	540 =	6F7A 3
180 =	E4E3 2	550 =	552 F
190 =	D79D 5	560 =	EDEA F
200 =	E6D4 A	570 =	344C E
210 =	BC9F F	580 =	688C 9
220 =	E87B 6	590 =	6890 3
230 =	B4A9 C	600 =	17E5 4
240 =	DEF4 B	610 =	FD82 3
250 =	6E98 3	620 =	80E0 E
260 =	DC4F B	630 =	6061 F
270 =	499A 5	640 =	D1AD 7
280 =	B0F 2	650 =	4377 8
290 =	30FA 1	660 =	BCA9 8
300 =	644A E	670 =	C110 7
310 =	2C01 3	680 =	F5B9 D
320 =	2053 8	690 =	8E29 1
330 =	2447 4	700 =	3696 8
340 =	ED0F 9	710 =	64D5 3
350 =	F5A5 A	720 =	1E59 D
360 =	BE11 0		
370 =	14A4 3		

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Archimedes ROM podule	£59.00 (d)
Archimedes I/O podule	£85.00 (d)
Archimedes Midi add-on to I/O podule	£39.00 (e)
Archimedes Midi podule	£69.00 (d)
Master 128	£369.00 (a)
Master Compact	From £310.00 (a)
Master Turbo Upgrade	£99.00 (c)
Master 512 Upgrade	£189.00 (c)
Master 128 Eprom Cartridge	£11.00 (c)
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Citizen MSP55 136col/250cps + 60cps NLQ	£520.00 (a)
Citizen HQP40 24pin 80col/200cps + 60cps LQ	£379.00 (a)
Citizen HQP45 24pin 136col/200cps + 60cps LQ	£454.00 (a)
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Star NR10 80col/240cps + 60cps NLQ	£334.00 (a)
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2 Year Warranty on Citizen, Juki and MP Printers

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All laser printers with1 year on site maintenance

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MAIN VARIABLES

Th	Angle of bar
go	Number of tries
Moment%	Bar weights to be matched
Noise%	Sound flag
Timer%	Timer flag
aX%,aY%	Position of pointer
moment%	Player's bar weight value
same%	Player-chosen-same-weights flag
time%	Amount of time taken to choose
c()	Cosine values for circle drawing
plp()	Player's weight positions
pos()	Weight positions to be matched
s()	Sine values for circle drawing

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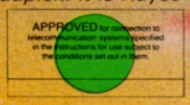

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Using your pad

Steve Turnbull gives a new look to an old concept

THE Concept keyboard is a great input device for educational programs – but strangely a lot of software just doesn't use it. To help alleviate the situation here's a program that lets you set up data for your own overlays and programs.

What it does is allow you to assign different strings to particular groups of keyboard locations then, using the routines given, incorporate the data easily into your own programs.

For example, you could write a shape recognition program with different overlays for the Concept keyboard. Using this utility you could prepare data files for each overlay and load the correct ones into your program.

Type in the utility, ensure it is correct using Get it Right! and save it. When it's run you are presented with a menu of seven items – the Concept keyboard is referred to as the pad within the program.

The first option allows you to design a new layout. A grid representing the keyboard layout is put on the screen and you're prompted to enter whether you'll be using the pad or micro keyboard for moving the cursor about the grid – press either P or K. Note that a position is selected when you lift your finger, not when you put it down, due to the way the Concept keyboard returns data.

To assign a string to an area of the pad you must chose two diagonal corners of a box – press Return to select – then you are prompted to enter the string to be assigned. At this point you have two choices: Either type in the string you want or, to kill any text within the box, just press Delete then Return.

Once text has been put into an area a set of blocks appears in the grid indicating where the string has been assigned. As you move the cursor around, the text for each area will appear where appropriate. You can return to the main menu at any time by pressing Escape.

Changing the layout

The second menu option allows you to alter the current layout and the next two are for loading and saving the data files to tape or disc. Printing – option five – simply gives a double column list of what strings are assigned to which pad areas.

The test routine can be used only if you have a Concept keyboard and displays the string of the selected location. The final option on the main menu simply exits the program – but you are warned if you have unsaved data.

So now you can extend the usefulness of your Concept keyboard by extracting some of the routines provided to build your own software to use the data files produced by this utility. First you must have the array *p$()* which contains all the strings, so in your initialisation routine you should have:

```
DIM p$(127)
```

Next you need to be able to load the files, so the routine PROCloadpad(f$) is essential. To actually load a data file called House into your program you'd use the line:

```
PROCloadpad("House")
```

The routine which actually gets the pad location that's been pressed is called FNgetpad. This returns a number – either –1, if no location has been pressed, or 0 to 127, depending on the place touched. To find this value you can use:

```
pad=FNgetpad
```

From here you can either use this number directly for any special actions – for example if you decide that location zero means return to the main menu:

```
DEF PROCpad
REPEAT
pad=FNgetpad
IF pad>0 THEN PROCdo_pad
UNTIL pad=0
ENDPROC
```

Or you can use the number to extract the string from the *p$()* array and take action from there:

```
REPEAT
pad=FNgetpad
text$=p$(pad)
IF text$="tree"PROCtree
IF text$="car"  PROCcar
IF text$="road"PROCroad
IF text$="sun"  PROCsun
UNTIL pad=0
ENDPROC
```

And that's all there is to it. Even if you're not the greatest programmer in the world it's fairly simple to provide some sort of micro feedback depending on what location has been pressed.

```
10 REM Concept Keyboard Utility
20 REM by Steve Turnbull
30 REM (c) The Micro User
40 ON ERROR PROCerror:END
50 MODE4:PROCinit
60 ON ERROR IF ERR<>17 PROCerror:END
70 REPEAT PROCmain
80 UNTIL end%
90 PROCquit:END
```

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"So now you can extend the usefulness of your Concept keyboard"

Availability

The Concept keyboard can be obtained from AB Micro Express, Wharfdale Road, Pentwyn, Cardiff CF2 7HB. Tel: 0222 733485.

Prices range from the basic A4 keyboard at £97.80 to a complete A3 pack at £153.30. The lead is £19.55 extra.

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```
  100 DEF PROCcon:VDU23;29194;0;0;0;0;::E
NDPROC
  110 DEF PROCcoff:VDU23;8202;0;0;0;0;::E
NDPROC
  120 DEF PROCinit:*FX4 1
  130 DIM p$(127):special$="*-."
  140 VDU&FF17;&FFFF;&FFFF;&FFFF;&FFFF;
  150 VDU&FE17;&2121;&B569;&B1BD;&004D;
  160 blk$=CHR$255:dlt$=CHR$254
  170 hi$="ABCDEFGHIJKLMNOPQRSTUVWXYZ"
  180 lo$="abcdefghijklmnopqrstuvwxyz"
  190 alf$=hi$+lo$:num$="0123456789"
  200 cr$=CHR$13:dl$=CHR$127
  210 ln$=CHR$21:spc$=CHR$32
  220 cor$=CHR$&88+CHR$&89+CHR$&8A+CHR$&
8B
  230 READ cmnds:DIM c$(cmnds)
  240 FOR C%=1 TO cmnds:READc$(C%):NEXT
  250 saved%=TRUE:end%=FALSE:ENDPROC
  260 DATA 7
  270 DATA Create pad layout
  280 DATA Edit current layout
  290 DATA Load new layout
  300 DATA Save current layout
  310 DATA Print current layout
  320 DATA Test current layout
  330 DATA Quit program
  340 DEF PROCquit:*FX4
  350 CLOSE#0:ON ERROR OFF
  360 PROCcon:PRINT:ENDPROC
  370 DEF PROCerror:PROCquit
  380 REPORT:PRINT" at line ";ERL
  390 ENDPROC
  400 DEF PROCmain:VDU3:*FX15
  410 PROChd("Concept Keyboard Utility")
  420 c%=FNgetcom(cmnds):PROChd(c$(c%))
  430 IF c%=1 PROCcreate
  440 IF c%=2 PROCedit
  450 IF c%=3 PROCload
  460 IF c%=4 PROCsave
  470 IF c%=5 PROCtest
  480 IF c%=6 PROCprint
  490 IF c%=7 IFNOTsaved%end%=FNreally
  500 ENDPROC
  510 DEF FNgetcom(C%):LOCAL N%
  520 PRINT':FOR N%=1 TO C%
  530 PRINTSPC6;N%") "c$(N%):NEXT
  540 PRINT"SPC8"Enter choice : ";
  550 REPEAT N%=GET-ASC"0"
  560 UNTIL N%>=1 AND N%<=C%:=N%
  570 DEF PROChd(t$):LOCAL X%
  580 VDU26,12:X%=(40-LENt$)DIV2
  590 PRINTTAB(X%,1)t$:ENDPROC
  600 DEF FNin(k$):PROCcon:*FX15
  610 LOCAL I%:REPEAT I%=INSTR(k$,GET$)
  620 UNTILI%<>0:PROCcoff:=I%
  630 DEF PROCcreate
  640 LOCAL crs%,oldloc%,pad%
  650 VDU28,0,31,39,21
  660 IFNOTsaved%IFNOTFNreally ENDPROC
  670 PROCgrid:PROCclear
  680 pad%=FNentry:saved%=FALSE
  690 REPEAT PROCinstruct
  700 UNTIL FALSE:ENDPROC
  710 DEF PROCgrid:LOCALX%,Y%
  720 VDU24,160;384;1120;896;29,160;384;
  730 FORX%=0TO960STEP60:MOVEX%,0
  740 DRAWX%,512:NEXT
  750 FORY%=0TO512STEP64:MOVE0,Y%
  760 DRAW960,Y%:NEXT:ENDPROC
  770 DEF PROCclear:LOCALX%:FORX%=0TO127
:p$(X%)="":NEXT:ENDPROC
  780 DEF PROCinstruct:LOCALch$,row1%,ro
w2%,col1%,col2%,t$,btm%,lft%,top%,rgt%
  790 GCOL3,1:PROCp(crs%,"+")
  800 REPEAT CLS:PROCbtmleft
  810 PROCtop_right:UNTILch$=cr$
  820 PRINTTAB(2,4)"Type in text : ";:t$
=FNtext:IFt$="" PROCdel:UNTILFALSE
  830 IFrow1%>row2% btm%=row1%:top%=row2
% ELSE btm%=row2%:top%=row1%
  840 IFcol1%<col2% lft%=col1%:rgt%=col2
% ELSE lft%=col2%:rgt%=col1%
  850 PROCset(btm%,lft%,top%,rgt%,t$)
  860 ENDPROC
  870 DEF PROCcrs(L%):GCOL3,1
  880 PROCp(oldloc%,"+"):PROCp(L%,"+")
  890 oldloc%=L%:ENDPROC
  900 DEF PROCbtmleft:LOCALc%:REPEAT
  910 PRINTTAB(2,0)"Current location is
";crs%SPC2'SPC2p$(crs%)SPC(38-LENp$(crs%
))
  920 IF pad% PROCpad(6) ELSE PROCkey(6)
  930 UNTILc%=5:PRINTTAB(2,0)"Corner 1 i
s ";crs%SPC80
  940 row1%=crs%DIV16:col1%=crs%MOD16
  950 GCOL3,1:PROCp(crs%,blk$)
  960 PROCcrs(crs%):ENDPROC
  970 DEF PROCmove(m%)
  980 IFm%=1crs%=crs%-1+3*INKEY-1
  990 IFm%=2crs%=crs%+1-3*INKEY-1
 1000 IFm%=4crs%=crs%-16+48*INKEY-1
 1010 IFm%=3crs%=crs%+16-48*INKEY-1
 1020 IFcrs%>127crs%=crs%-128
 1030 IFcrs%<0crs%=crs%+128
 1040 ENDPROC
 1050 DEF PROCtop_right:LOCALc%:REPEAT
 1060 PRINTTAB(2,2)"Current location is
";crs%SPC2'SPC2p$(crs%)SPC(38-LENp$(crs%
))
 1070 IF pad% PROCpad(6) ELSE PROCkey(6)
 1080 UNTILc%>4:PRINTTAB(2,2)"Corner 2 i
s ";crs%SPC80
 1090 IFc%=5 ch$=cr$ ELSE ch$=dl$:PROCde
l:ENDPROC
 1100 row2%=crs%DIV16:col2%=crs%MOD16
 1110 ENDPROC
 1120 DEF PROCdel:LOCAL c%:c%=row1%*16+c
ol1%
 1130 GCOL4,1:PROCp(c%,blk$):ENDPROC
 1140 DEF PROCset(B%,L%,T%,R%,t$)
 1150 LOCAL P%:IF t$=dlt$ t$=""
 1160 FOR P%=T%*16+L% TO B%*16+R%
 1170 IF(P%MOD16<L%)OR(P%MOD16>R%) ELSE
GCOL 0,1-(t$="");p$(P%)=t$:PROCp(P%,blk$
)
 1180 NEXT:ENDPROC
 1190 DEF FNtext:LOCALi$,a$,o$,X%,Y%,a%
 1200 a%=6:X%=POS:Y%=VPOS:PRINTSPC200
 1210 REPEAT a$=alf$+num$+cr$+dl$+spc$
 1220 IF o$="" a$=a$+special$:PRINTTAB(2
,6)"Use <Delete> to kill pad entries";:V
DU31X%Y% ELSE a$=a$+ln$
 1230 IFLENo$=1 PRINTTAB(2,a%)SPC34:VDU3
1X%+1Y%
 1240 IF o$=dlt$ a$=cr$+dl$+ln$
 1250 i$=MID$(a$,FNin(a$),1)
 1260 IF i$=ln$ PRINTSTRING$(LENo$,dl$);
:o$=""
 1270 IF i$<>dl$ ELSEIF o$="" i$=dlt$ EL
SE VDU127:o$=LEFT$(o$,LENo$-1)
 1280 IF (i$<>ln$) IF (i$<>dl$) IF (i$<>
cr$) PRINTi$;:o$=o$+i$
 1290 UNTIL i$=cr$
 1300 PRINTTAB(0,Y%)SPC80;:=o$
 1310 DEF PROCedit:LOCALcrs%,oldloc%,pad
%
 1320 PROCgrid:PROCdisplay
 1330 VDU28,0,31,39,21
 1340 saved%=FALSE:pad%=FNentry
 1350 REPEAT PROCinstruct
 1360 UNTIL FALSE:ENDPROC
 1370 DEF PROCdisplay:LOCALP%
 1380 FORP%=0TO127:IFp$(P%)<>"" PROCp(P%
,blk$)
 1390 NEXT:ENDPROC
 1400 DEF PROCsave:LOCALH%,f$,Y%,X%
 1410 f$=FNgetfile:IF f$="" ENDPROC
 1420 saved%=TRUE:H%=OPENOUT(f$):PRINT"
'SPC5"Saving layout..."
 1430 FORX%=0TO127:PRINT#H%,p$(X%):NEXT:
CLOSE#H%:ENDPROC
 1440 DEF FNgetfile:LOCALa$,i$,t$
 1450 X%=4:Y%=VPOS+3
 1460 PRINTTAB(X%+1,Y%)SPC160TAB(X%+1,Y%
)"File name : ";
 1470 REPEAT a$=alf$+num$+cr$
 1480 IF t$>"" a$=a$+dl$+ln$
 1490 i$=MID$(a$,FNin(a$),1)
 1500 IF i$=ln$ PRINTSTRING$(LENt$,dl$);
:t$=""
 1510 IF i$=dl$ VDU127:t$=LEFT$(t$,LENt$
-1)
 1520 IF(i$<>dl$)IF(i$<>ln$)IF(i$<>cr$)I
FLENt$<8 t$=t$+i$:PRINTi$;
 1530 UNTIL i$=cr$:=t$
 1540 DEF PROCload:LOCALf$,H%,Y%,X%
 1550 IFNOTsaved%IFNOTFNreally ENDPROC
 1560 PRINT'SPC5"Loading layout...";
 1570 PROCloadpad(FNgetfile)
 1580 saved%=FALSE:ENDPROC
 1590 DEF PROCloadpad(f$):LOCAL H%,L%
 1600 IFf$>"":H%=OPENUP(f$):ELSE:ENDPROC
 1610 FORL%=0TO127:INPUT#H%,p$(L%):NEXT
 1620 CLOSE#H%:ENDPROC
 1630 DEF PROCtest:LOCAL P%
 1640 PROCgrid:PROCdisplay
 1650 VDU28,0,31,39,21
 1660 PRINTTAB(2)"Touch pad to display"
SPC2"Press <Escape> to exit."
 1670 REPEAT P%=FNgetpad
 1680 IF P%>-1 PROCtest_pad(P%)
 1690 UNTILFALSE:ENDPROC
 1700 DEF FNgetpad:LOCAL P%,Q%
 1710 P%=FNport:Q%=FNport:IF P%<>Q% =-1
 1720 REPEATUNTIL P%<>FNport:VDU7:=P%
 1730 DEF FNport:LOCAL A%,X%,Y%
 1740 A%=151:X%=&62:Y%=&FF:CALL&FFF4
 1750 A%=150:X%=&60:Y%=USR(&FFF4)
 1760 =(Y%DIV&10000)AND&7F
 1770 DEF PROCtest_pad(L%)
 1780 GCOL 3,1:PROCp(L%,"@")
 1790 PRINTTAB(1,5)"Location is ";L%SPC2
"SPC2p$(L%)SPC30
 1800 PROCp(L%,"@"):ENDPROC
 1810 DEF PROCcli($&700):LOCALX%,Y%
 1820 Y%=7:CALL&FFF7:ENDPROC
 1830 DEF PROCprint:LOCALX%:VDU2,1,12
 1840 PRINT"Concept Keyboard Layout"
 1850 VDU1,13:FOR X%=0 TO 127 STEP 2
 1860 PRINTX%SPC2p$(X%)SPC(30-LENp$(X%))
X%+1SPC2p$(X%+1)
 1870 NEXT:VDU2,1,13,1,12,3:ENDPROC
 1880 DEF FNentry:PRINTSPC5"Entry from k
eyboard or pad : ";:=FNin("KP")=2
 1890 DEF PROCkey(y%)
 1900 PRINTTAB(2,y%)"Enter cursor to mov
e"SPC12'SPC8"<Return> to fix location"'S
PC8"<Delete> fixed location : ";:c%=FNin
(cor$+cr$+dl$)
 1910 IFc%<5 PROCmove(c%):PROCcrs(crs%)
 1920 ENDPROC
 1930 DEF PROCpad(y%):LOCAL i$,I%
 1940 PRINTTAB(2,y%)"Touch pad to move"S
PC15'SPC2"Enter <Return> to fix location
"'SPC8"<Delete> fixed location : ";
 1950 I%=FNgetpad:i$=INKEY$0
 1960 IF I%>-1 crs%=I%:PROCcrs(crs%)
 1970 IF(i$<>"") IF (i$<>cr$) IF (i$<>dl
$) VDU7
```

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VISA

◀ *From Page 48*

```
1980 IF i$=cr$ c%=5 ELSE IF i$=dl$ c%=6
ELSE c%=0
1990 PROCcoff:ENDPROC
2000 DEF FNreally
2010 PRINT"SPC5"If you continue you wil
l"SPC5"lose your current layout. Okay?"
;
2020 =(FNin("YN")=1)
2030 DEF PROCp(O%,c$)
2040 VDU25,4,FNx(O%);FNy(O%);
2050 VDU5,ASCc$,4:ENDPROC
2060 DEF FNx(L%)=L%MOD16*60+20
2070 DEF FNy(L%)=(8-L%DIV16)*64-20
```

```
10 =    0 0     90 = C88B B    170 =  9D7 8    330 = 7533 1    680 = D9D3 5    1030 = C152 1    1380 = 6F9C B    1730 =  D99 8
20 =    0 0    100 = 8620 7    180 = 4B98 3    340 = 3235 F    690 = E665 2    1040 = ED0F F    1390 = E531 2    1740 = 3087 6
30 =    0 0    110 = 7749 E    190 = EB84 6    350 = C69E 6    700 = CAFF 1    1050 = 91EE 1    1400 = 6439 3    1750 =  EDA 9
40 = 917E E    120 = BD34 4    200 = 229D 4    360 = 72AD 3    710 = A495 6    1060 = 4D58 3    1410 = EFE6 5    1760 = FF15 9
50 = 49E8 7    130 =  B4B 3    210 = 6ED6 0    370 = 3327 2    720 = 4711 6    1070 = 29AF 6    1420 = F9B9 0    1770 = DC3C 8
60 = 7985 C    140 = 674B 8    220 = 82FF 0    380 = 6BDF E    730 = 633C C    1080 = B1AC E    1430 = 9B04 C    1780 = 8E1A D
70 = E837 7    150 = CF04 F    230 = B621 9    390 = ED0F E    740 = CF39 5    1090 = 7EE1 8    1440 = 4514 3    1790 = 9181 7
80 =  19F 6    160 = 73F1 A    240 = A4EE 4    400 = 82FF 2    750 = A4EB D    1100 =  920 D    1450 = 5010 8    1800 = 6FAD B
                               250 = 67A5 E    410 = B00E E    760 = FDC9 7    1110 = ED0F A    1460 = AD2B 9    1810 = E7E2 6
                               260 = 50A7 9    420 = C65A B    770 = 3ACC 3    1120 = AD6E 0    1470 = 554F 7    1820 = 50E0 7
                               270 = 9A8E 8    430 = 5E56 3    780 = C99A 0    1130 = 6601 1    1480 = B430 B    1830 = 20B0 F
                               280 = 2BF2 3    440 = DB0E 2    790 = 3AA4 4    1140 = CC40 F    1490 = 5067 E    1840 = 143C 0
                               290 = 458E 7    450 = FB71 D    800 = FBC1 D    1150 = 34CB C    1500 = B2B3 E    1850 = 789B 4
                               300 = 9FA8 0    460 = BCB8 0    810 = 9FF2 4    1160 = 7BCB 8    1510 = BF38 E    1860 = 4773 4
                               310 = EF8F 3    470 = 74D1 5    820 = E8DD 0    1170 = 872B 2    1520 =  790 2    1870 = E1BE 6
                               320 = 8D54 9    480 = B2E3 8    830 = 2E81 1    1180 = E531 B    1530 = 93EB 4    1880 = DB80 B
                                               490 = 9C92 7    840 = FFF1 9    1190 = FD4F 8    1540 = D899 C    1890 =  6CE 4
                                               500 = ED0F F    850 = F21D D    1200 = 26AD 8    1550 = 28E3 0    1900 = 2696 4
                                               510 = C6BD 3    860 = ED0F 0    1210 = 78C6 9    1560 = AB04 A    1910 = F761 6
                                               520 = C953 A    870 = 31CF 6    1220 = 1E76 5    1570 =  1BB E    1920 = ED0F F
                                               530 = 21B2 C    880 = 3AFA D    1230 = 8DBB B    1580 =  39A A    1930 = 9B17 A
                                               540 = A180 0    890 = 39C4 E    1240 =  F14 8    1590 = A140 0    1940 = 69D0 9
                                               550 = DB82 0    900 = 269E 0    1250 = 5067 3    1600 = 2783 6    1950 = D1F6 C
                                               560 = 20AF 5    910 = 62B3 E    1260 = FA29 A    1610 = 137F 7    1960 = F461 3
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                                               580 = EEB3 7    930 = D94C 9    1280 =  250 6    1630 = ADAE 4    1980 = 193C 7
                                               590 = AF20 F    940 = E1EA 4    1290 = 3EDE 6    1640 = A882 5    1990 = F277 4
                                               600 = 8D19 3    950 = 5DEB D    1300 = E2AD 4    1650 = B5CB 5    2000 =  6C5 E
                                               610 = 5960 8    960 = 9E95 3    1310 = 3D16 1    1660 = 5DE9 3    2010 = ADDA 9
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                                               670 = 114A 7   1020 = 2FC7 6    1370 = 2291 3    1720 = 3D52 B    2070 = 43D8 D
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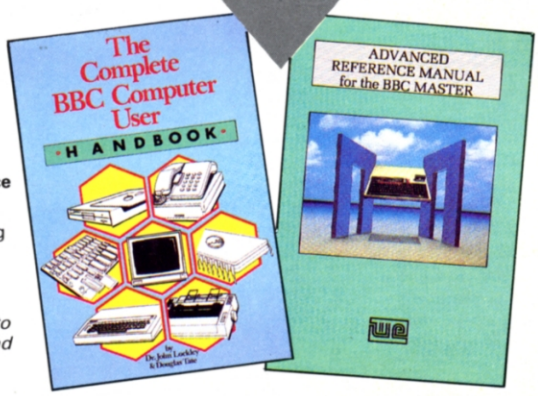

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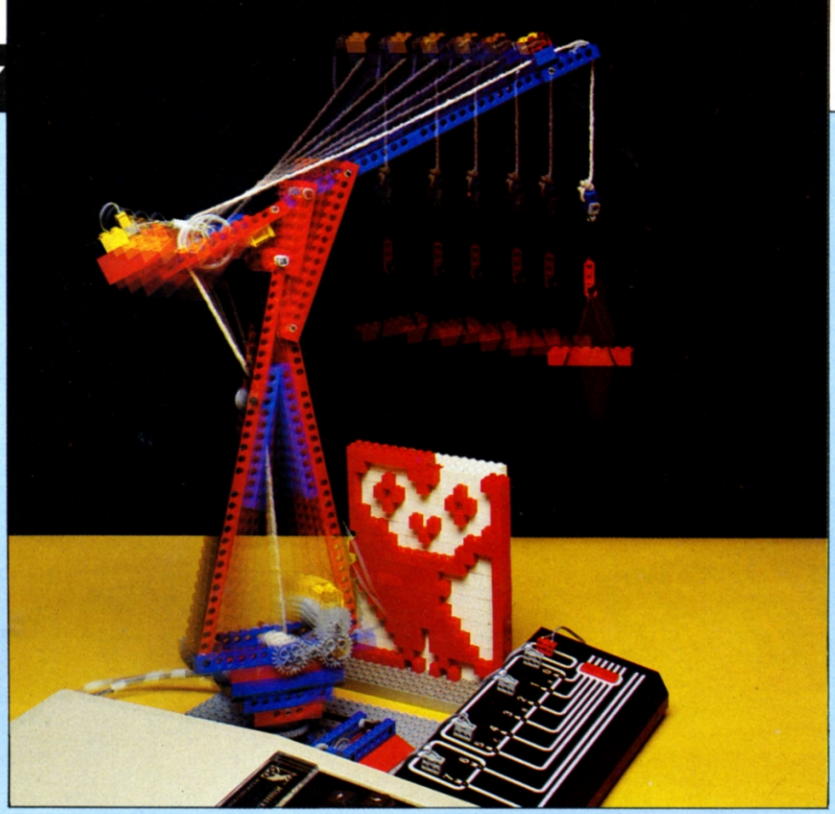


'The format encourages you to move away from the familiar pupil work card and towards a cross-curricular thematic approach'

Building bricks in education

Alan Wickham constructs a promising future

Product: Lego Control Logo
Price: approx £100 for Interface and Power Pack, £90 for Lego Set 9700 and £90 for the Resource Pack
Supplier: Lego UK, Ruthin Road, Wrexham. Clwyd LL13 7YQ.
Tel: 0978 290900

CONTROL Lego links the well-known construction materials and the computer language Logo in a control technology package. Aimed at 7 to 13-year-olds, the complete pack consists of support materials for teachers, Lego construction kit, interface and Logo. The format encourages you to move away from the familiar pupil workcard and towards a cross-curricular thematic approach – a refreshing step forward for any primary school teacher.

It takes on board current educational thinking as well as providing the support materials to enable you to become competent and confident with control technology.

The resource pack which accompanies it consists of six booklets. The first is an introduction justifying the use of technology in the primary school by reference to both education reports and the reality of the increasingly technological world of micro-electronics in which we live. It's a very useful piece of literature to borrow from someone with the pack and loan it to the head of the PTA when you're trying to drum up support and money to buy it.

Booklet two gives some other teachers' experience with the pack in four case studies. Their efforts and successes make interesting reading although they did leave me with some feelings of inadequacy. Under the heading of Issues from the Case Studies was sound, no nonsense, practical advice on classroon management and resources – sections such as Organising the Children, Organising the Work Area and Organising Resources. It's all easy and very useful reading.

With feelings of confidence and itching to attack the Lego I began a school holiday armed with some of the booklets, a BBC Micro and the other necessary components. I started with the third booklet – the tutorial and a comprehensive guide to Logo. It offers a step-by-step approach to learning how to control working models. No previous knowledge is assumed and the tutorial starts with instruction on fitting a Logo chip – an optional extra – into your BBC Micro and ends with programming the Lego buggy, built from Lego Technic Card 9700-8.

This follows a black wavy line by means of a Lego brick emitting infra-red light – the optosensor. The path to this finale was a mixture of joy,

disappointments, emotion and frustration.

At times I couldn't help feeling that this was all too much as I struggled to comprehend recursive procedures, superprocedures and global variables. Yet frustrations are forgotten and outweighed by the satisfaction of success.

The tutorial takes you through the stages, and though some of the steps seem to be quite large, the clarity of writing and the careful consideration of likely pitfalls will see most readers through to the end.

Now feeling capable of running my own Logo courses for teachers I set about Booklet five in order to discover more about Technic Construction Kit 9700, elements they contain and how they can be fitted to produce different types of movement.

The gear combinations needed to change speed and direction were made clear by a wealth of informative pictures, diagrams and simple statements. The mysteries of my own car's construction were unveiled as I built a simple gearbox using various cogs, axles, bushes and assorted delights from the kit. A real treat of a booklet.

You may be wondering what happened to Booklet four. This is a quick reference guide to the Lego control language – a Control Logo Dictionary. It becomes very useful later on if you forget the exact wording of an instruction or when saving or loading files from disc.

Booklet six illustrates how three different themes – workplaces, markets and fairs – and other worlds can be explored in a cross-curricular way incorporating control technology. It contains workwebs suggested by Lego and ones used by trials teachers. Ideas put forward by the authors are supplemented by classroom examples which highlight the way problem solving is involved in designing, building and controlling models with the micro.

Assistance in implementing the themes is given by the introduction of music and it is surprisingly easy to write the relevant procedures for the notes. Eventually I had Strawberry Fair drifting out of my computer.

Tired of reading of the exploits of others, I now turned my attention to the challenge of introducing the package to my top infant class. I chose in particular two pupils – Joanne and Adam – one with experience of a BBC Micro and the other having used the Technic Lego.

For two weeks they played with the Lego and simple Logo commands. After a few days of random model building they built a simple car with a motor attached. This was done by following one of the Lego cards provided, though its easy to build the part of picture you can see, the hidden side of the drawing can cause problems.

Using this car they experimented with simple commands to turn the power on and off and make the vehicle go backwards and forwards in different sequences. Soon they were solving little problems I set: Make the car go forwards for four seconds, backwards for three and introduce a light brick to act as a headlight – which introduced them to another dimension.

I now started to incorporate this package into other class projects – a topic on wheels. After the whole class had visited a working water wheel they constructed replicas from wood and card and from Lego. The latter soon became an entire water mill: Wheel house, office, machinery, lighting and workers.

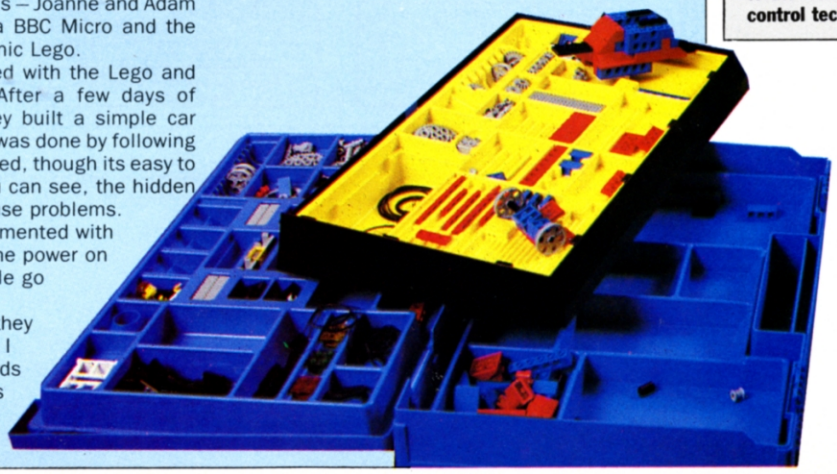
Class discussion on the working day at the mill led to the micro being used to control lights,

machinery and the motor driven water wheel. These came on to simulate morning and afternoon working. During the lunchbreak a Lego cart arrived to unload and then reversed away. They even learned to slow the wheel to a realistic simulated speed using SETPOWER.

Joanne and Adam overcame the problems with discussion, cooperation and mediated arguments. Seeing them learning and experimenting was one of the best results of the experiment and my only regret is that in the time available I could not involve more children and teachers.

The bottom line...

An expensive package, but a superb introduction to the world of control technology



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MUG

THE INDEPENDENT MicroLink User Group NEWSLETTER

Personal telex is here

Many small businesses and individuals subscribe to MicroLink to get access to the telex service. This allows messages composed on a computer to be sent to the MicroLink mainframe and then on to the international telex network, and incoming telexes to be sent to the user's mailbox. It's much the same as having a telex, only without the need for a separate line.

Telex has had its problems, but with the new computer and some new software it's now a reliable and effective service. And this month has seen another enhancement.

Until now users have had to share telex numbers, with their MicroLink mailbox number quoted in the same line. This is a clumsy system open to mistakes, especially when expecting replies from overseas.

Now everyone can have their own telex number and two character answerback, in exactly the same way as ordinary telex machines.

The upgrade is free to those users who've already registered for telex; others can register for the usual fee of £10 and get their number. Reaction from users has been very favourable, which is not surprising since individual numbers have been semi-promised for a rather long time.

Got your number?

It's not going to set the world alight – in fact, it might even qualify as the most boring thing to say at a party – but MicroLink has started to offer a back-to-front telephone area service.

If you know a telephone number but don't know where it is, or know the area but not the STD code, the new MicroLink service will fill in the missing information.

Uses? Well, if you know that Grub's Computer Store has a telephone number of (0752) 80261 MicroLink will tell you that they peddle their wares in Plymouth.

Again, not an everyday service, but it's nice to know it's there.

Moving further afield

Last month we mentioned the LoadLink service for removal companies in the UK. There's another area on MicroLink called The Box, which takes the same idea and turns it into a worldwide information exchange.

It's intended for firms using, buying or selling containers. There are three main sections on The Box.

One is for companies to list their surplus containers or publicise their requirements. According to MicroLink, there are 40 to 50,000 such businesses in the UK.

The second area is a list of space available and wanted. This is intended for shipping lines, road transportation firms and anyone else involved in moving those big metal boxes around the place.

The last area is for rental companies to maintain an up-to-date list of available containers.

While The Box is based on MicroLink, the links with the telex network mean that firms without access to a computer can still make use of the listings.

Like the industry it serves, it's international in scope and should help keep the estimated five million containers around the globe moving just a little more smoothly.

If you're interested in The Box, the man to contact is John Evans, MAG61002.

Keeping it quiet

This has never been a problem with MicroLink, but now purveyors of gossip, tittletattle and rumours about the computer industry have a new source of transatlantic tales. The popular (and free) NewsBytes service – the UK side of which is run by journalist and noted computer security expert Steve Gold (MAG066) – has sprouted a gossip column.

Hot from the States, it covers the odder side of the news that might get printed in the magazines months later.

Play up, and play the games

A long, long time ago on a computer far, far away the first programmer sat down and wrote the first program. Shortly afterwards, he wrote the first game.

Ever since then, computerised entertainment has followed the development of hardware, and rare indeed is the computer with no games. The MicroLink computer isn't rare at all; it has a wide selection of non-serious software.

Some seem to date back to those early days. And a few are so abysmal as to be worth playing out of sheer perversity – there's the automatic "Shakesperian" sonnet generator which has a maple fixation, and the highly advanced coin tosser. It's a very mixed bag indeed.

But there are a couple of good adventures – plus a couple of dodgy ones – Star Trek, the intriguingly named Sinners, and quite a few more.

Don't expect graphics or sound. Do expect to be amused more by age than awesomeness.

But be very careful – some are just as addictive as anything you can buy in the High Street.

Write all about it

Another idea doing the rounds of MicroLink at the moment is that of a journalist's user group. It's been mooted by Tony Quinn (MAG70450), who's using MicroLink to help sort things out.

Unlike other groups, this one's not intended to be limited to journalists working in the computer field. Anyone who uses computers or electronic mail to help them in their writing work could well be interested in joining it.

And how about a programmer's group? This has been discussed on the MicroLink Bulletin Board, where there are a number of programmers of varying persuasions.

One idea has been the design and production of programs to run on the MicroLink computer itself, programs which could be sold to the rest of the Dialcom network.

Another is the swapping of information about problem solving and programming products.

Again, electronic mail is the ideal medium with which to run such a group. Mail Rupert Goodwins (MAG95816) for more information on this.

Suggestions of material for inclusion in the MUG Newsletter should be sent to Rupert Goodwins on MAG95816

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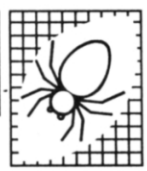

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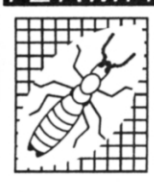

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CEEFAX Guide

B B+ M

Software is currently transmitted for a period of one week. The files are updated on Fridays and there will be periods during the update day when files are unavailable. The program details given are provisional.

September 2 to 8

T/SWR09
Peek
Part nine of the series designed to make more use of sideways ram facilities continues its study of the arguments accompanying a star command and how such parameters are interpreted.

T/DFS04
Convert
Part four of a new series describing the Acorn DFS and how to make use of the lesser known facilities of the filing system software. T/DFS04 explains how to convert 40 track discs to run on 80 track drives.

Radar
Are you having trouble deciding where to take your holiday? This short but very useful program works out the bearing and distance to any location on Earth, basing its calculations simply on longitudinal and latitudinal coordinates.

Cymraeg
Dataun
Crewr
Datadau
Geiriad
Pedwar
Saesneg
Meistr
Hyffor
Use BBC Basic, but program in Welsh. This amazing utility will allow you to translate your existing Basic 1,2 or 4 into Welsh by producing a sideways rom image of the Welsh version. From then on, use the Welsh Basic keywords as listed in the dictionaries Geiriad and Saesneg.

Pipeline
Can you mend the gaps in this futuristic plumbing game set in the world of leaks and droids. It first appeared in the March issue of *The Micro User*.

September 9 to 15

T/SWR10
Vector
Lock
Part 10 in the series explaining how to make use of sideways ram in the BBC Micro looks at how to alter vectors to point to your own routines held in main memory or sideways ram instead of the normal OS ones. A cassette file locking routine is provided as an example.

T/DFS05
DualDFS
Offset
The series showing how to get more from your DFS continues its study of 40/80 track disc compatibility, showing how to create discs that work on both systems.

SSTrade
Step back in time and become the captain of a trading ship sailing the south China seas. This one player game involves a lot of skill and strategy.

Title
Zoom
Pixel
Colfill
Prog1
Prog2
Images created from sources like video digitisers can now be edited and modified to suit your precise purpose, with this comprehensive suite of programs.

Minicom
Speed up your graphics routines with this real Basic compiler from the March issue of *The Micro User*.

September 16 to 22

T/SWR11
Private
Trace
You often need to make sideways ram programs use some user memory as workspace. T/SWR11 looks at how a rom should make a request for such an area to be allocated for its sole use – a principle demonstrated with an example program that reads the number of disc cycles on the default disc drive.

T/DFS06
Sector5
Encode
Decode
IDSDump
Verify
Protecting your own software from *pirates* is a difficult task – particularly for those with little knowledge of the workings of the Acorn disc operating system. T/DFS06 looks at how to create copy-protected single density discs to help make your own work more secure.

Circuit
Bridge
RCL
Instr
Divide
Circuit allows the analysis of electronic circuits containing resistors, capacitors, inductors, current and voltage sources. The details to be analysed are entered in text form and can be studied under the influence of either a DC or AC supply.

Bingo
B/text
There's no need to visit the bingo hall on Saturday nights any more – this program will let you play all the bingo you want from the comfort of your own armchair.

Command
Take on the mighty German biplanes in a relentless battle over a cornish harbour town. The game first appeared in the August 1985 issue of *The Micro User*.

September 23 to Sept 29

T/SWR12
Absol
Intlace
Trace
Part 12 in the series describing sideways ram and rom on the BBC Micro looks at rom absolute workspace. This area is only likely to be needed by more advanced users, but an illegal use of the call to claim it can result in a variety of useful effects. The demonstration program shows how to use this facility to keep the video interlace turned off.

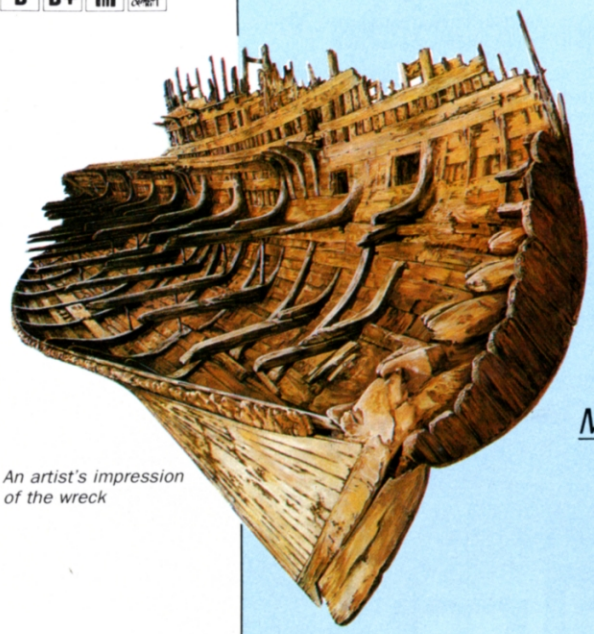
T/DFS07
CopyDFS
CopyAll
Deform
IDSDump
Verify
Last week's module from our series studying the Acorn DFS showed some techniques for protecting your own work using specially formatted discs to prevent unauthorised copying. T/DFS07 looks at how you can duplicate the discs you have applied such protection to.

Gravtxt
Pendulm
Prjctle
An educational study of the effects of gravity on objects such as a pendulum or projectile. Their movement is simulated on-screen and their course plotted.

Voida2
V2fileA
Boost your concentration capacity with this high speed action game. Let your imagination run wild as you steer your ship through a barrage of oncoming obstacles. Just to add to your problems, the game gets increasingly harder as you go.

Flash
Extend your micro's limited colour palette and flash some completely different combinations with this useful utility from the August 1985 issue of *The Micro User*.

B B+ M Master



An artist's impression of the wreck

Dredging up the past

Marshal Anderson raises a few ghosts

Product: Mary Rose – new version
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BACK in 1982, when The Mary Rose program was first published, it was hailed as a new kind of package. It consisted not only of a piece of software but also a plethora of other resources – charts, posters, reference materials and so on – provided by the Mary Rose Trust. This was seen as a jolly good idea and soon everyone was doing it.

However, there were drawbacks to the approach – the main one being that such packages tended to cost between three and six times as much as we were used to paying.

But at the time we were all looking for a way to justify the use of the machines beyond drill and practice. So this package by Brian Richardson was just the ticket as it moved the focus from the micro to the subject matter, with the machine playing an important but subordinate role.

The program then consisted of two parts. The first was the search for the wreck of the Mary Rose. This was at the time, a quite wonderous piece of programming with high resolution graphics, colour and jolly little *pling plings* from the echo sounder. Having sailed around Plymouth Sound for a while, developing search strategies and using reference materials to narrow down the area, children spotted the wreck and could move on to the diving phase. Here, unfortunately, the whole thing was in danger of becoming a bore.

What you had was a kind of disclosure program, not a million miles away from the Developing Tray, but quite different in content – we were disclosing a buried wreck.

Sounds exciting? Not when it is text only: "Ahead you can see mud." A lot of teachers, with the materials provided by Cambridgeshire Software, worked very hard at making this interesting because they believed in the idea.

The educational press was also full of it for a while and you might suspect that a few careers were launched on the strength of using Mary Rose well in the classroom.

It all went quiet and then came the new version. This Mary Rose program exhibits the same copius array of backup materials: Postcards of the excavation and various finds, a set of slides of artifacts, a poster of the sinking of the ship, a book showing drawings and photos of the various finds referred to in the program and a book giving a wealth of information about all aspects of the Mary Rose.

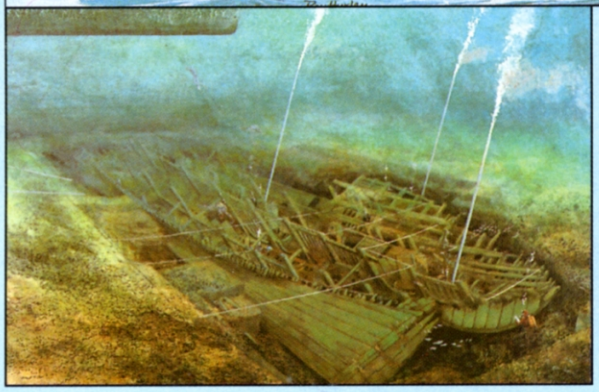
The teachers' guide is short and concise, telling you exactly what you need to know in nine pages – a considerable improvement on the original tome.

The actual program is very simple to use, having done away with all the diving checks and got on with the exciting bit of digging up the ship. On booting the single disc you are presented with a little diver on the screen, Control+D sends him to the bottom and you begin shifting mud. As you dig away, using the cursor keys, the hull of the ship is slowly revealed.

The screen is divided into three areas: The top 40 per cent is occupied with a plan view of the sea bed while the rest is split to show a vertical cross section of the mud – and hull as it appears – and various status information. At first all is straightforward, simply digging away at the yellow mud, but soon your little diver starts to find things.

The hull is drawn in red and its remains are uncovered to slowly reveal the overall shape of the ship. This is really nice: It creates excitement and interest, especially as children take a while to realise they are dealing with a ship lying on its side and have to work hard to move their diver around the hull at the lower levels.

As they slowly uncover the timbers they also find artifacts – each has a number that refers to a find in the reference book provided. The find is then raised by a red bucket lowered from the ship above – a nice touch. By noting where different objects were discovered children can make



An artist's impression of operations in 1981

A slide from the pack

guesses as to the function of that part of the ship.

This all fits in very nicely with current thinking on the teaching of history, and deserves a place in many primary and secondary schools. At the end of each session the new state of excavation is saved as the starting point for next time.

This is not really a program that will work well in isolation: To have relevance to the child it should be part of a wider set of activities based around a wider set of resources, even, than those provided.

To the staff at our school it gave fresh impetus to a resource consigned to the stockroom a couple of years ago and it has to be said that, in combination with the materials and survey program provided with the original, this is a substantial package.

It is well worth upgrading your copy if you already have it – there's little duplication of materials – and it's recommended to those coming new to it, though it might well be worth looking for the loan of the original survey program to spice it up.

This is the first real upgrade of a commercial education package that we have seen, and shows how time dates only the implementation of an idea, not the idea itself. Perhaps we might hope for a few more re-issues in the future.

B B+ M

Featuring

Thunderstruck
Bonecruncher
Rocket Raid

Superior solutions always available

Hac Man looks into Bonecruncher and solves Thunderstruck

SUPERIOR'S excellent Bonecruncher has been one of my favourite games for most of this year, probably second only to FireTrack as my game of the year for 1987. However, a letter from Ian Edwards of Wolverhampton has prompted me to clarify an important point that is not mentioned anywhere in the instructions.

Like the screens of Repton 3 and those produced with its editor, the 24 screens of Bonecruncher are grouped into a number of different files – four of six screens in this case. The program knows the full set of passwords and will attempt to load whichever file contains the appropriate screen.

'It's an immensely playable game'

After you have completed the sixth screen, if you are using disc the program quickly loads screens 7 to 12. If you are playing the game from tape, however, each time you complete six screens you must wait until the next set loads – which can become a little tedious. Nevertheless I think it is a good idea to have one continuous game on this scale. After all, the vastness of Repton 2 didn't seem to deter anyone.

But Ian's letter outlines a problem that is more serious than a lack of instructions. When he completed level six, the tape restarted with the message *Searching for 2.0* – the second set of screens. However, the tape just played to the end without finding anything.

I'm always inclined to suspect the tape player, but when I checked out my own cassette copy I found it happened on my version – even unplugging every rom except Basic made no difference. On the cassette version each extra file is loaded as a continuous stream, bypassing the conventional CFS, so that the files do not show up when you *CAT the tape.

I thought it was another case of a loading routine being incompatible with the Acorn serial ULA used in the B+, Master and many of the series 7 Model Bs until I tried my tape on an older Model B with the Ferranti ULA and got the same result.

I then consulted Richard Hanson of Superior. He had not come across this problem but would, as always, be happy to help anyone experiencing difficulties of this kind. Just return the tape with an sae and a letter detailing your roms, internal expansions, external add-ons and so on, and Superior will do its best to help.

To go off at a tangent, the full set of passwords for Bonecruncher are:

1: none	13: PEWTER
2: BEGINNER	14: UNDERTAKE
3: ATOMIC	15: COLLAPSE
4: COMPLEX	16: GENERATOR
5: ANIMAL	17: TORTURE
6: NOMINAL	18: AMENDMENT
7: CABBAGE	19: ULTIMATE
8: TOLERANCE	20: MONOTONE
9: OVERLORD	21: COUNTDOWN
10: CRAZY CAVE	22: FATIGUE
11: CROSSWORD	23: SABOTAGE
12: INTEREST	24: DARKNESS

and the competition password is – or rather was – EXCALIBUR. I haven't quite got that far yet, being still stuck on Fatigue.

In spite of Bonecruncher's external similarities to Repton, it is an immensely playable game in its own right. My enthusiasm for it has not waned since I reviewed it in the March 1988 issue of *The Micro User* and I think it would be a pity if it was just to be a one-off. Will we be seeing sequels – maybe even Bono's Designer Dungeons?

Raid from the grave

Here's a blast from the past. Graham West of Weymouth, Dorset has sent me a couple of pokes for Acornsoft's golden oldie Rocket Raid cassette. Enter the listing exactly as shown, then insert a blank tape and type:

```
*SPOOL RRCHEAT
LIST
*SPOOL
```

to save the cheat routine in a usable format.

Load the Rocket Raid game as normal until the RAID and RAID2 files have loaded. Press Escape as soon as the *Searching* message appears. Insert your own tape and type *EXEC RRCHEAT to load the routine.

Put the Rocket Raid tape back and type RUN to load the main file – RAIDOBJ. When this has loaded, you will be presented with a new menu inviting you to select infinite lives, invulnerability or a normal game.

I checked this out with my version 2.1 and it worked perfectly. There is an earlier one that does not support joysticks and I can't say if these pokes will work on that one – in fact I'd be very surprised if they did. Perhaps one of our readers could help?

To find out the version number of any cassette-based Acornsoft games: Load the game as normal, hit Break and type:

```
*CAT
```

and a message similar to:

```
V1.2        00 0000
```

will appear after a few seconds.

If only it were this easy to distinguish between different versions of games from other software houses...

Rocket Raid cheat

```
  710 REM Rocket Raid infinite
lives/invulnerability
  720 REM by Graham West
  730 REM (C) The Micro User
  740 REM
  750 PROCcheat
 2900 DEFPROCcheat:PRINT
 3000 PROCdouble(CHR$(134)+"Ch
eat Menu"):PROCcentre(CHR$(149)
+STRING$(37,CHR$(115)),5)
 3100 PROCcentre("1.......Infi
nite lives",7)
 3200 PROCcentre("2.........I
mmortality",9)
 3300 PROCcentre("3.........N
ormal Game",11)
 3400 PROCcentre(CHR$(149)+STR
ING$(37,CHR$(115)),15):PROCcent
re(CHR$(130)+"Press <1-3> to ch
oose",20)
 3500 REPEAT:A$=GET$:UNTIL A$>
="1" AND A$<="3"
 3600 IF A$="1" THEN ?&178F=?&
178F EOR &63
 3700 IF A$="2" THEN ?&174D=?&
174D EOR &CD
 3800 FOR I%=2 TO 20
 3900 PRINT TAB(0,I%);STRING$(
40," ")
 4000 NEXT:PRINT TAB(0,2);
 4100 ENDPROC
```

Roll of thunder

Veteran readers may remember the first complete solution/map/pokes operation this column performed on a game. It appeared in the June 1987 issue and was based on Peter Scott's ThunderStruck II: The MindMaster. However, TSII's predecessor, the original **ThunderStruck** has its own unique appeal and is still very popular. In response to a number of letters from readers here is a full solution – culled partly from hints sent in by David Nickells, Chris Axton and N. Blake:

Go left from your starting position and collect the cellar key. Drop it in the room outside the lift. Take the match from level two and use it to light the candle on level four. Take the candle down to level eight and leave it there. Go back to level four and collect the key. Take it down to level eight and open the door at the top of the stairs.

Go up to level six and go left until you find the oil can. Take care not to fall through to level seven or you will have to restart the game. Pick up the oil can and return to level eight. Go across to the faulty droid and use the oil can. This causes it to jump up, allowing you through to the next section of level eight. Return to the lift.

Go up to level five and get the letter N. *This is one of four letters that make up a code to lower the castle's drawbridge – located on level seven. Go to the drawbridge and use the letter. Repeat for the* O *on level three and the* D *on level six.*

Get the red key from level eight and use it to open the door on level four – in the room where you found the cellar key. Go through to the next room and jump up onto the brick ledge. You will find that the room immediately to the left has no roof. Jump up to find two more rooms. Take the yellow key at the top right-hand corner of this first screen. On the second screen, immediately to the left of the first, you will find the Queen – come back to her later.

Drop back down to the main section of level four and head left. You will find a chicken at the top of the stairs, which you can eat at any time to restore your energy level to maximum. Take the key up to level one and open the yellow door. Go down to level two, collect the wine and return to level one.

Go through the main section of level one and up on to the roof, vaulting over the Craftsman on the way. There you will find the Guard: Give him the wine and he'll disappear, leaving a clear path to the letter W. *Take it down to level seven and lower the drawbridge.*

Take the empty bucket from your starting location on level four and fill it up from the well on the far side of level seven. Take it up to level three where you will find a room – the fifth from the lift – with three plant pots on the ground. The middle one is actually a beanstalk: Use the bucket of water to make it grow. Go back down to

Turn to Page 62 ▶

◀ From Page 61

level seven and get the green key. Take it up to level three and open the door in the room past the beanstalk.

Go through and you will come to the Sad Wizard. Take the broken wand lying next to his cauldron and give it to the Craftsman on level one. Take it back and you will find that you are now carrying a fixed wand.

When you give it back to the Wizard, he will reward you with a stop spell. Take this down to level five, drop it and go up to level three. Take the radio and return to level five. Use the radio to open the screen, then take the stop spell and use it to freeze the birds in the room to the left of the hungry dog. On subsequent visits to this room you will find that they have disappeared altogether.

Go up to level one and get the bone, take it down to the dog – who goes by the name of Fido – and he will give you the letters ME *in return. Take the letters up to level one and drop them on the teleporter pad on the roof. Take the gold coin from level six and give it to the King at the far side of level five.*

He gives you the letters GO *in return: Take them up to the teleporter pad and leave them with* ME. *Incidentally, in the room to the right of the King, the food – which looks to me like an ice cream sundae – has the same very useful effect as the chicken mentioned earlier: It restores your energy to maximum. Take the skin cream from level three and give it to the Revolting Hag at the far side of level eight. She will reward you with a move spell.*

Go up to level one and on to the roof. Go to the far right-hand side and use the move spell. The flat-headed creature flying backwards and forwards across a gap in the middle of the screen will jump upwards and move back and forth across the length of the screen. Do not move off this screen or the creature will revert to its original position and you will be left without any means of raising it.

Stand on it's head and jump off when it reaches the right-hand wall. Collect the freedom key from the right-hand end of the roof and give it to the Trapped Maiden. She will reward you with the letters HO, *which you should take to the teleport pad. Go down to the main section of level one and take the stool, then go down to level three.*

Climb the beanstalk and head left. You will come to a crown hidden behind a wall. Jump over the wall and take it then use the stool to jump back out. Take the crown to the Queen, who will give you a Strange Box in return. Go to the teleporter and use it to activate the teleporter which transports you home.

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Delivery dates

Acorn has been quoting long delivery times for the Archimedes 410. Why is there a delay?

● *Who knows the workings of the corporate Acorn mind? But here are a few ideas. Why sell a 410 when you can sell all the 440s you can make? Also there is a current world shortage of 1Mb memory chips so it makes sense to channel them into the more expensive product.*

Wrong design?

I have heard that the board for the 410 is being re-designed. Does this mean that there is something wrong with the current A440 board?

● *Not necessarily. It is often easier to see ways of making a new micro more economical to produce after it gets into production. For example, with fluctuating chip prices it is sometimes necessary to redesign a circuit to make use of cheaper and more easily obtainable ones.*

Page sizes

What determines the ram page size on the Archimedes? Is it related to the amount of memory or whether it's a 300 or 400? Put another way, does the 410 use 8k pages due to having 1Mb of memory, or does it use 32k pages due to it being a 400 series machine?

● *The page size is determined entirely by the hardware – how the memory chips are wired up. Therefore on a 1Mb 410 you will have 32k pages.*

Hard disc compatibility

I have heard that the Model B compatible hard discs will not work with the Archimedes I/O podule's 1MHz bus. Does this mean that external hard discs are not possible on the Archimedes?

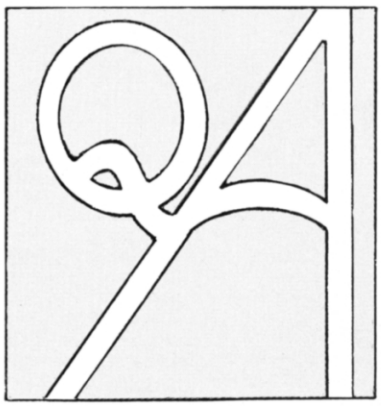
● *It is true that the Model B compatible hard discs will not work with the Archimedes. This is because the disc filing system software has not been written to expect them at that location, but it will be possible to add extra hard discs using an expansion card.*

Big deal

Can the 400 series backplane be fitted to a 310 to allow the use of four expansion cards and the floating point co-processor?

● *The 310 has a 64 way pin connector for the backplane as opposed to the 96 pin one on the 400 series, and the extra row is not wired up on the 310.*

To fit a 400 series backplane you would have to remove the original socket – very tricky – before drilling the extra row of holes and finally wiring up the 32 bits data bus direct to the middle row of the socket. Having done that you would have to get hold of a 400 series backplane and, as the 400 series comes complete with a backplane fitted, who will provide it alone?



More memory

Can the 1Mb ram on a 310 be upgraded to 4Mb by replacing the 32 x 256k bit chips with 32 X 1Mb bit chips?

● *No. There is a different number of pins on these ICs, and apart from that, the address decoding and refreshing circuitry is not on the 310's board. However we would not be surprised to see someone producing extra usable memory for the 310 before long.*

Sampling sound

I want to build the Body Build sound sampler. Will it work with the Archimedes using the 1MHz bus on the I/O podule and the software emulator?

● *Unfortunately this will not work as the sampler software accesses memory directly for speed. Access to the 1MHz bus on the I/O podule is through system calls. This is much slower than the model B using direct access. Therefore the sampler software would need to be entirely re-written using Risc code.*

Risc lessons

Is Arm machine code easier to learn than 6502 code?

● *It is not so much easier to learn as very different. A beginner would probably have the same difficulty with either, but having learnt the instruction set and its variations, Arm code is so powerful that many tasks are much easier to write.*

Software availability

Is there much software available for the Archimedes?

● *The software catalogue is growing rapidly. According to Acorn, since last Christmas its software department has been receiving notification of new software at a rate of one package every working day.*

The Archimedes oracle

We answer your problems about:

- ★ **Availability of the 410**
- ★ **Series 40 PCB design**
- ★ **Page memory allocation**
- ★ **Adding more hard discs**
- ★ **Fitting more expansion cards**
- ★ **300 series memory upgrade**
- ★ **Body Build sound sampler**
- ★ **Learning Arm machine code**
- ★ **Getting Archie software**

We are receiving a large number of questions about the Acorn Archimedes. Some of them are dealt with here, and we will be answering more over the next few months.
So if you have any questions about the super micro from Acorn don't hesitate to send them to:

Archimedes Questions,
The Micro User,
Europa House,
Adlington Park,
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The Mad Hatter on the road to adventure

Becoming Elitist

THAT fascinating game Elite continues to attract correspondence, and readers might like to know that I am going to deal with the second mission as soon as I can. This will involve my starting from scratch because, as some of you will remember, I gained Elite status – for the fourth time – partly on a borrowed Master 128. Some difference in status flags meant that when I went back to my BBC B and 6502 second processor configuration after the First Mission, I plodded on to Elite without encountering Mission Two.

Meanwhile, here are some helpful and interesting contributions: J. Stanton says there are Generation Ships to be found in the middle of Galaxy Four.

He asks where you start the mission in Galaxy Two. Well, if you earned your first *Right on Commander* in Galaxy One you will eventually be directed to use galactic hyperspace, which lands you in Galaxy Two. Your destination is Cearso, an Anarchy system, which will involve much firing of lasers. If you earn your commendation anywhere else I don't know how to advise you.

What I *can* do is offer a saved status before the start of Mission 1. But I can only guarantee it will work for those who have the same hardware configuration as myself.

If you want to take advantage of this offer, send a formatted 80 track disc and a return address label with stamps to the value of 30p to me at *The Micro User* office. You will then have all the equipment I consider necessary to complete the mission, and you'll only need to make a few more kills to start it.

Sean Marsh writes to tell me that the maximum amount of platinum that can be traded at a profit

It's Hobbit forming

I AM amazed at the way *The Hobbit* continues to arouse interest. Far from being a hoary old chestnut of an adventure, it appears to have evergreen qualities. A chat with Hac Man a while back coincided with a number of letters indicating that readers were still having Hobbit problems – and not just because they had ignored my earlier advice, either.

First, the point that Hac Man made helped me to obtain pictures throughout the adventure, not just in The Hobbit's early stages. If you – like me – prepared a picture disc and then put write-protect tabs on it – *take them off*. Apparently the program requires the disc to be written to at various points in the adventure. Protective tabs prevent this, but naturally, no warning can be found in the accompanying literature.

Now for readers' problems. Many of you find Thorin utterly nauseating and are glad to leave him behind as soon as possible. This is a mistake: His death must be as a consequence of Smaug's halitosis if you are to gain maximum points. So, for this month, let me help you to take the little monster – Thorin, that is, not Smaug – safely through the Elf King's domains to Lake Town.

If you need help for the early part of The Hobbit,

The Mad Hatter delves even deeper into Elite and Dungeon Adventure

is 99kg. He says that a wraparound occurs at 100kg, resetting the value to zero.

Sean has completed the second mission, but notices his reward of a naval energy unit does not register on the inventory list. That is true, but he will find that his in-combat energy recharge rate has improved.

A few of you have enquired further about the ship depicted on-screen before entering the game proper. At first you see a Cobra Mark 3, but if you then load a new commander the ship changes. Closer study of the Flight Training Manual convinces me it is an Asp Mark II. Have many of you waited a while at this stage to see the amusing sequence reminiscent of Star Wars?

If you have the earlier disc version of Elite, pressing N in response to the *New Commander?* prompt produces a Krait. I hope that clears matters up.

Sean also mentions that he is now back in Galaxy One. Here, in the vicinity of Quzadi – a Communist system in the south of the galaxy – he has encountered several Anacondas. In combat these discharge several small ships which take about two hits to destroy. Are they Worms, he asks, and why have they only appeared now?

I don't know the answer to this: Sean has the first disc version, but once I have completed the second mission myself I'll investigate the generation ship phenomenon in Galaxy Four and look into the spawning Anacondas. Meanwhile, if readers have any tips I'll be glad to pass them on.

The final comment on Elite for this month comes from Alan Young. He starts his letter with the astounding claim that using the keyboard is more difficult that a joystick where Elite is concerned.

I can only say that I achieved Elite status via the keyboard, then tried using a joystick out of interest. I gave up after five minutes. I find the keyboard permits far more sensitive handling of things – but I guess it's a matter of individual taste.

However, Alan's main concern was docking procedures, and he offers advice for two methods of docking safely. But remember, this is for those who use joysticks – I might offer my own advice for keyboard users if demand warrants it.

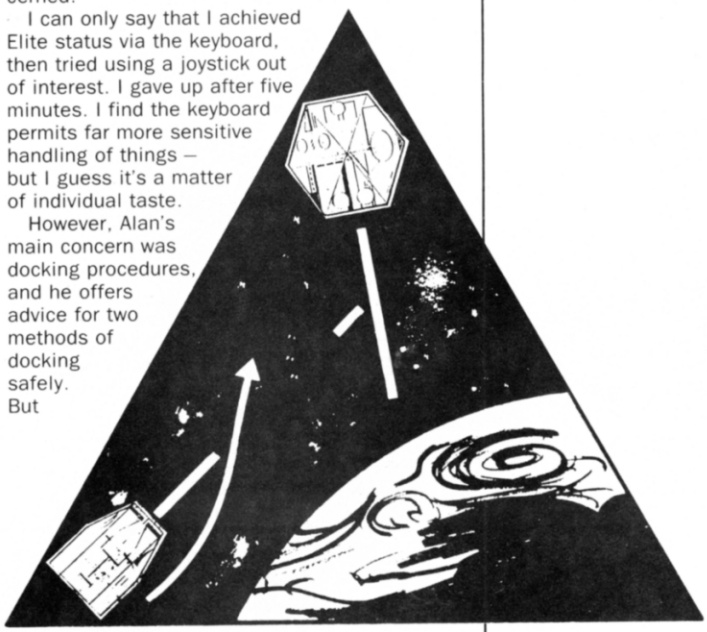

Figure I: Initial approach to space station

● Descend towards the planet until your altitude gauge reads 1/4, stop, using long range – LR – radar rotate until the station is in the centre of the display and accelerate towards the space station.
● When the safe sign appears on the radar, stop and rotate until the planet and station are visible on the forward screen, one to the left of the laser sight and one to the right – see Figure I.

Rotate until the station is at the top of the screen and accelerate – Figure II overleaf. The station will appear on the fore/aft line of the 3D radar. Proceed until its dot on the LR radar changes size and colour and stop. Pull up until the station is in the middle of the laser sight and accelerate gently.

● As you made your final approach the docking face of the station should appear to rotate evenly about the centre of the laser sight. If it doesn't,

Turn to Page 68 ▶

please refer to the August 1987 issue of *The Micro User*: I am going to assume you have negotiated the goblins' caves safely and have got the ring.

Move the curtain in Beorn's Hall, open the cupboard and get the food. If you haven't yet lunched at Elrond's expense, now is the time to do so. When you enter Mirkwood, leave the Bulbous Eyes for the homeward trip and go to the stream. The command THROW ROPE ACROSS RIVER is essential and, once successful, do the logical follow-up. Remember, this is not a spoon-feeding column – I assume you are intelligent!

Use the sword to cut spiders' webs and eventually you will be in the elvish clearing where the magic door is NE, the web is E, and you can take the path W. Examine the magic door and this will trigger the arrival of the elves: Then all you have to do is follow them – but do make sure Thorin is with you. It might be as well to SAVE here.

Once you are in the elves' dungeon with Thorin things are both difficult and easy: It's a matter of timing, really. First, with the help of the ring find your way around. Second, by judiciously asking the Butler, get the red key so that you can come and go at will.

Finally, persuade Thorin to get into the barrel *while the butler is holding it* and you remain uncaptured. This is not as easy as it seems owing to the pseudo-random elements programmed into The Hobbit.

Once the butler has thrown the barrel down the opened trap door with Thorin inside it is vital that you enter JUMP ONTO BARREL. Anything else will result in your being killed. If you have dohe all this correctly, SAVE and wait for next month's column. If not, just keep trying: The Hobbit is an adventure that rewards persistence rather than intelligence.

Until next month, happy adventuring.

Figure II: Final approach

◀ *From Page 67*

wait until the opening of the docking tunnel appears, stop, and centralise this on the sight. Now allow the station to rotate until its bulk is above the sight. Push down until the station is between the sight and the top of your view, then accelerate.

Approach further, then centralise the station on your sight. Rotate right until your spin matches the station's and the opening to the docking tunnel is horizontal. You may now dock safely.

Down into the Dungeon

The solution to **Dungeon Adventure** continues first with a look at the area around the cylindrical room. When you reach the jet of flame light the driftwood, then go N and – to take and wear it, see last month – rub the helmet. Take the crucifix and continue N to the cylindrical room. From there go W, where you'll find the bow which allows you to move SW from the cylindrical room, corpse

– examine, and take – and orange collar – rub it – then W again for the cube.

Return to the cylindrical room and go E to the storeroom with the haystack. Examine or search the haystack and, so long as you are holding the cube – a magnet – you will find the needle, which you must take.

Now go back to the cylindrical room and leave it by going NW to the dead end room with the octopus figurine, and take it. Return to the cylindrical room and move NE – you can't do it without the octopus – to the second dead end room. Here take the staff and rub the yellow collar.

You can now store the needle, cube and orange collar in the packing case. Return to the cylindrical room and then go SE. This will take you to the junction in the U-shaped passages where there is a blocked opening E.

There are three round rocks here, so naturally you TURN each of them in order to learn that – having left no stone unturned – you can now proceed East. If you do so, you are confronted with a rolling boulder on a mossy carpet. Dungeon Adventure provides proverbs galore, puns indescribable and pleasure inexplicable. So you should STOP the boulder. It gathers the moss and reveals a sword – dragons for the killing of – for you to take.

At this point I think I should describe the teleport system which operates in the caverns. I do not, however, recommend that you launch out into the deep just yet. We have already seen that two collars of different colours are to be found in the caverns. These are part of a combined security and teleportation system. To give an example, you cannot move SE from the cylindrical room unless you are wearing a collar.

The next thing adventurers should notice is that collars and pedestals are closely connected. Wear a collar of a particular colour and then SAY *Colour* and you will be transported instantly to a pedestal of that colour.

Because the collars are graded in value, you can extend your range as you find ones with colours higher up the spectrum. You can always teleport to a colour lower in the spectrum than the collar you are wearing.

Mithril is the highest colour of collar to be found – and I can promise you, you won't do that in a hurry. At least once I found a pillar was a place of refuge before I discovered the teleportation business: I am so dim that my IQ could almost be black on that score. More next month.

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Double for your money

Mike Cook tries out Watford's latest disc filing system

Product: Double Density Disc filing system
Price: £39 (special offer)
Supplier: Watford Electronics, Jessa House, 250 Lower High Street, Watford WD1 2AN
Tel: 0923 37774

PERHAPS the biggest complaint about the Acorn DFS disc format is its lack of space and limited number of files. Now Watford Electronics has produced the latest version of its double density disc filing system – the DDFS Mk 2 version 1.54T – offering a fully Tube compatible double density system that will, in addition, emulate the standard single density system.

What you get is a plug-in board, a sideways rom, two driver chips and two staple-like links. The board is of a high quality construction and uses the turned pin piler system to ensure no damage occurs to the original socket.

In all cases the board simply plugs into the socket of IC78. If you already have a DFS interface fitted you will have to remove one other small chip and place a link on the empty socket. If not, you add two links to empty sockets and fit two disc bus-driver chips. You will also have to fit the sideways rom containing the driving software.

I installed the DDFS on my old model B but instructions are included for the B+, Master and Compact. As full and clear instructions are supplied, the procedure is quite straightforward – and also reversible.

The 115 page manual, with index, covers a useful introduction to what disc storage is all about for beginners, and there is a reference section outlining each command. Because all the Watford DFS systems are covered by the manual perhaps there is scope for confusion. However, a section at the start indicates what you can and can't do with your version.

The only major omission from this new disc system, when compared with the Watford single density DFS, is the sector editor which couldn't be included because the Tube software has been added.

The system is intelligent in that it will work with either single or double density and 40 or 80 track. There is no need to set this manually as the DDFS keeps trying different combinations of data and track densities until it finds one that works.

The manual warns about a delay when the disc format is being decoded, but it wasn't noticeable in normal use. Where there is a slight delay is when the disc is damaged and will not load anyway – naturally an unintelligent system reports this fact sooner.

When you format a disc you are asked if you want it to be single density or double density, after that the system looks after itself. It would be advisable, however, to mark your double density discs as such in case you want to use them on someone else's micro.

All the added features of the Watford DFS are here, such as an optional 62 file directory, default work file name, information on the amount of space left on the disc and the *TIDY command that closes all open files. Also formatting does not affect the contents of the main memory – very useful for the times when you have no room left on your disc, no discs formatted but a program that you need to save.

The test of any disc system is not how much you

Turn to Page 72 ►

WHY DOUBLE DENSITY?

You can get more data on a double density disc – but things are never that simple. You are restricted to 31 – or optionally 62 – files, so you might find yourself running out of files before you run out of disc space. Given a single sided 80 track disc you have 360k of storage on a double density system. This means that with 62 files you have an average file length of about 5.8k per file.

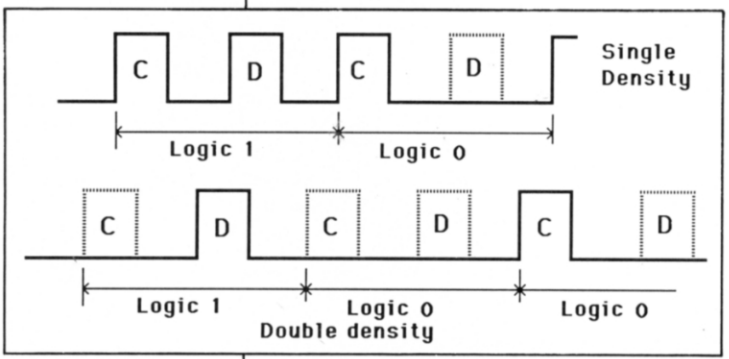
Now with a single density system you have about 200k of free space, giving about 3.2k per file. The reason you don't get quite twice as much storage with double density is that the basic sector size has to be kept the same for compatibility. As each sector carries a fixed overhead over and above that needed for data storage, you can't simply double the number of sectors per track. Therefore you can only get 18 sectors of 256 bytes per track on a double density system as opposed to the normal 10.

So if you are saving a lot of large files, like screen dumps, word processor files or long runs of data, a double density system can be more convenient. Not only will it cut down on your disc bill but, perhaps more importantly, you will need physically fewer discs, making them much easier to store. Another advantage with this system is that the maximum length of a file can be the whole 360k of the disc. The standard Acorn system restricts the length of any one file to 64k.

◀ From Page 71

notice it but how much you don't – it should get on with the the job and not bother you.

I fitted the DDFS in place of the Watford single density system I normally use. While I do not have every piece of protected software to try, an assortment of new releases I had in for review all worked well. I tried out the Tube software on the second processor and again, unspectacularly, no problems were encountered. So if you are in the market for a double density disc filing system, this one seems to offer all you could ask for.



The pulses stored on a disc

DENSE DATA

A little hazy about the difference between single density and double density? Here is a quick rundown:

In the single density mode each bit period starts with a clock pulse. Then in the centre of the period there is a pulse if we have a logic 1 and no pulse if a logic zero.

With double density the clock pulse is missing except when the byte is a logic zero and the previous byte was a logic zero. In this way the pulse density is reduced and, as the minimum size of a pulse is fixed, we can get twice as much data per pulse.

There is a little confusion as to the the sort of discs you need to use with a double density system. Discs are advertised as single or double density, but this refers solely to the track density, in other words whether you want to use them in 40 track or 80 track drives.

The pulses recorded on the disc are the same distance apart for single and double density, the only difference is how they are interpreted. Therefore, on a 40 track system you need only single density discs to run a double density system.

Incidently I have used single density discs for years on an 80 track system and I have never found one that would not work.

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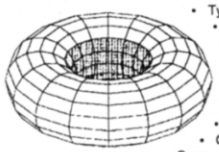

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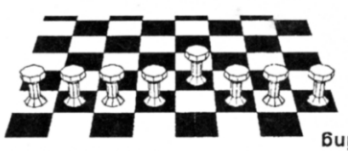

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What price your data?

You can cut the cost of running your Z88 – but should you? Peter Davidson presents the options

PEOPLE often ask me whether they should use alkaline or rechargable batteries in their Z88. I usually answer yes and leave as quickly as I can. However, that cop out stops here, so let's consider the design of the Z88 before answering this tricky question.

The machine works off four batteries that produce about 7v when fully charged. A "battery low" warning comes on at around 4.8v, and the display is cut off at about 3.5v. This leaves enough power to retain the memory for a while, giving you a chance to change the batteries, but all is not lost until their output falls to around 1.5v.

Plugging the mains adapter into the Z88 causes a drop of about 1v until it takes over from the batteries. That's why the battery low indicator sometimes comes on as you connect the adaptor – it means your batteries are below about 5.8v. You can clear the warning by switching the micro off and back on, providing that power is coming from the mains.

Now for the batteries themselves. Four alkaline's start their charged lives at around 7v and fall off gradually at a fairly steady rate. They refresh themselves slightly if they're not being used, but let's ignore that to keep things simple. Rechargables start lower – nearer 6v – and retain a full charge longer, but they then fall off rapidly.

If you think about how these two decay patterns fit the voltage levels that cause the battery low warning and retain the memory after the screen fails you'll see that your data is safer if you use alkaline batteries – after all, the Z88 was designed with them in mind. They'll last about 20 hours and you get warnings at sensible intervals.

Using them, the battery low warning comes about four hours before the screen display is cut off. Even then, with the low power drain of the Z88 when it's not processing, your data is safe for up to a month.

However, rechargeable batteries start much nearer the level that causes the battery low warning to appear, so a lot of processing will have to be done with that showing. Also, when they are nearly flat and the screen is automatically disabled to retain the memory, rechargeables are at a level where their voltage falls quickly so you may have less than 24 hours before your data is lost.

So is it safe to use rechargeables? The answer is yes, provided you are careful not to let them get too low and take care to copy your data to your BBC Micro regularly, and are not too worried if the data is lost from the Z88 – after all that's why you you copy it over to your BBC Micro.

Alkaline batteries are much more reliable but in the long run will cost more. So it's up to you to choose between data safety and cost.

"This leaves enough power to retain the memory for a while"

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IMPORTANT: The BBC points out that a teletext adapter, like a TV set, will not work satisfactorily without a good outside aerial. Nor will it function correctly if you experience reception problems such as ghosting. They emphasise that these problems only affect a few areas of the country. However if you have any doubts as to the quality of signal available in your area you should contact the BBC Technical Support Service during office hours on 01-927 5040.

TO ORDER PLEASE USE THE FORM ON PAGE 135

Let's get our act together

John Allen presents a powerful way to join your BBC Micro to a Z88

IN the January issue of *The Micro User* we gave you a program for simple transfers between your BBC Micro and a Z88. Since then we've published utilities to backup the whole contents of the memory (March), send and convert files to Wordwise and Mini Office II (June) and to copy Basic programs (July). Now here's BBC Link II – a powerful way to connect your two micros.

What all the previous methods have in common is that they link up with the Z88's Import/Export utility. So in order to use them you need to set one micro to receive and the other to send. As even the most careful of us get these operations mixed up as we try to control two micros at once, Cambridge Computer has come up with an eprom cartridge for the Z88 which allows another machine to take total control of a transfer.

So far the only software to use it is PipeDream – on the Archimedes and PC – and PC Link II – Cambridge Computer's package to connect the Z88 to a PC. As they have no plans to release a BBC Link II we've done our own.

After the eprom has been inserted into the Z88 it is activated by pressing □L and from then on it gets its instructions from a remote computer at the end of a serial link. Instructions that it can deal with include displaying Z88 devices, directories and filenames and sending and receiving files. Used in conjunction with our BBC Link II program, transferring files becomes a doddle. If you haven't a copy of the eprom, don't worry, the whole kit – eprom, lead and the link program – is available complete or as individual parts – see the panel opposite.

Type in the program, save it as LINK and run it. Activate the eprom on the Z88 with □L and, provided everything is OK, pressing any key on the BBC Micro will make the main LINK menu appear. If it doesn't – and you're sure that you have copied the program correctly – there's either something wrong with your lead or you've got one of the early versions of the PC Link II eprom – one that's not labelled as the International version – and the baud rates don't match up.

If this is the case press ESC on the Z88, select the panel – □S – and set the send and receive rates to 9600 baud, parity to *none* and Xon/Xoff to *no*. Then start again.

To use the link, move the blue highlight bar around the options on the BBC Micro screen with the cursor keys and press Return to select.

Let's look at how to transfer a file from the Z88 to the BBC Micro first.

When you first run Link it is set up to transfer files from the Z88's root directory of :RAM.0. You can alter this from the options displayed, but if you change directory remember that the Z88 follows the MSdos conventions – selecting "." means stay in the current directory and ".." will move to the parent one.

The Z88 File option shows you a list of files in the current directory and device and selecting one with the highlight bar means that you want to transfer it to the BBC Micro – if you change your

Turn to Page 76 ▶

A bug in the rom

The early PC Link II roms don't transfer the data correctly. They're fine for text but not for Basic programs or data files. The problem is that bytes in the range &10-&1F on the Z88 were transferred to the BBC Micro as bytes in the range &20-&2F. So if you sent the file back to the Z88 it wasn't the same as when it went.

If you find this problem with your rom you should contact Cambridge Computer who'll exchange it for one that works correctly.

EXCLUSIVE READER OFFER

We have arranged with Cambridge Computer to make the BBC Link II eprom available to our readers. Together with this month's *Micro User* disc and a BBC Micro/Z88 lead you have all you need for easy transfer of files between the two machines.

And, as a bonus, you'll also have the other listings from this issue. The prices are:

Z88 eprom and BBC Micro disc £28.95

Complete kit: Z88 eprom, BBC Micro disc and lead £34.95

ORDER FORM ON PAGE 135

◀ *From Page 75*

mind simply press Escape or select Quit. Link will suggest a valid BBC Micro filename: If that's acceptable just press Return and the file will be sent. Or you can type in another name – including drive and directory if required – and this will be used.

The other options on the main menu allow you to show a list of BBC files in the current directory and transfer them to the Z88 using a similar procedure to the one we've just described for sending files the other way. You can also select an option to let you enter star commands, for example to change the current drive or directory. Be careful not to use commands like *COPY which destroy user memory.

The final option is Quit. This allows you to leave Link and also tells the Z88 rom that you've finished so the micro can revert to its previous suspended activity. You should note that while the rom is active on the Z88 the machine will not time out, so you should quit if you're not intending to use the link for a while.

Finally, there are a few things worth noting: Because the program can only display up to 32 menu options on the screen at a time you may find that not all of the Z88 files – or the whole of an ADFS directory – is shown. In that case, moving the highlight bar down when it's at the bottom of the display will show another page of up to 32 entries. You can move up and down between any number of pages simply by moving the highlight bar up or down over the page boundary. ADFS users will find that the menu of BBC Micro files will display directory names among those of the files. If you select one of them, Link assumes that you want to move it and will display its contents.

Finally, you need to make sure that there is enough space for the file in your selected Z88 device as Link does not check for the Z88 running out of space. Unfortunately, to do this in Basic would slow Link down to about half its present speed and pressure of space precludes its implementation in machine code.

The menu system

The menuing system can be used as part of other programs. It's contained in PROCmenu and PROCborder. The parameters for PROCmenu are:

title$	The title of the box
no%	The number of items to display
pos%	The item to be initially highlighted

The text items to be displayed should be in the array *list$*.

Line 1560 needs to be changed to CLS and 1810 becomes just ENDPROC. Lines 1570 and 1580 should be modified to contain your heading. PROCmenu should only be entered in MODE 7 (or MODE 135 on the BBC Master).

```
  10 REM BBC-Link II for Z88
  20 REM by John Allen
  30 :
  40 DIM list$(150),dirs$(20)
  50 DIM command 100
  60 PROCassemble
  70 device$=":RAM.0/":dir$="":nodir%=0
  80 MODE7
  90 *FX7,7
 100 *FX8,7
 110 *FX4,1
 120 *FX15,0
 130 PRINT ""Make Sure the Link progr
amme is""running on the Z88 and then""
 press any key":X$=GET$
 140 CALL z88
 150 PROCsynch:IF K%<0 THEN CALL key:PR
INT 'CHR$(131);"No connection":GOTO 120
 160 ?&80=27:CALL send
 170 ?&80=ASC"A":CALL send
 180 CALL rec:IF ?&80 <> 27 THEN GOTO 1
390
 190 CALL rec:IF ?&80 <> ASC"Y" THEN GO
TO 1390
 200 CALL key:PRINT 'CHR$(131);"Link es
tablished"
 210 TIME=0:REPEAT:UNTIL TIME=150
 220 act%=1
 230 ON ERROR GOTO 240
 240 RESTORE:FOR I%=0 TO 5:READ list$(I
%):NEXT
 250 PROCmenu("Select action",5,act%)
 260 act%=action%-1
 270 ON action% GOTO 300,380,490,550,70
0,1090
 280 :
 290 REM  Quit
 300 PROCsynch
 310 ?&80=27:CALL send
 320 ?&80=ASC"Q":CALL send
 330 CALL rec:CALL rec
 340 CALL key:*FX4,0
 350 MODE7:PRINT "BBC / Z88 Link finis
hed.":END
 360 :
 370 REM  get Z88 device
 380 PROCsynch
 390 ?&80=27:CALL send
 400 ?&80=ASC"H":CALL send
 410 I%=0
 420 REPEAT
 430 CALL dev:I%=I%+1:list$(I%)=$name%
 440 UNTIL $name%=""
 450 PROCmenu("Select device",I%-1,2)
 460 IF action%>1 THEN device$=list$(ac
tion%-1)+"/"
 470 GOTO 240
 480 :
 490 REM '*' command
 500 CALL key:VDU31,0,13:INPUT "*" comm
and$
 510 ON ERROR REPORT:GOTO 530
 520 PROCoscli(command$)
 530 ON ERROR GOTO 240
 540 PRINT " Press any key":X%=GET:GOT
O 240
 550 :
 560 REM  get Z88 directory
 570 PROCstring("D",device$+dir$,0)
 580 I%=0
 590 REPEAT
 600 CALL dev
 610 I%=I%+1:list$(I%)=$name%
 620 UNTIL $name%=""
 630 PROCmenu(device$+dir$+" select dir
",I%-1,2)
 640 IF action%=1 OR list$(action%-1)="
." THEN GOTO 240
 650 IF list$(action%-1)".." AND nodir
%>0 THEN nodir%=nodir%-1 ELSE nodir%=nod
ir%+1:dirs$(nodir%)=list$(action%-1)
 660 dir$="":IF nodir%>0 THEN FOR I%=1
TO nodir%:dir$=dir$+dirs$(I%)+"/":NEXT
 670 GOTO 240
 680 :
 690 REM  send BBC file
 700 CALL key:CALL bbcfiles
 710 K%=0:FOR I%=1 TO 48-con?5
 720 list$(I%)=""
 730 FOR J%=1 TO name%?K%
 740 add$=CHR$(name%?(K%+J%))
 750 IF add$<>" " THEN list$(I%)=list$(
I%)+add$
 760 NEXT
 770 K%=K%+name%?K% +1
 780 NEXT
 790 PROCmenu("Select BBC file",I%-1,1)
 800 IF action%=1 THEN GOTO 240
 810 file$=list$(action%-1)
 820 $name%=file$:CALL ftype
 830 IF ?&80=1 THEN H%=OPENIN file$ ELS
E PROCoscli("DIR "+file$):GOTO 700
 840 CALL key:VDU28,0,24,39,3:CLS:VDU26
 850 VDU31,0,6:PROCborder("Transfer fil
```

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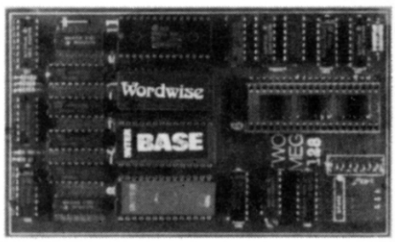

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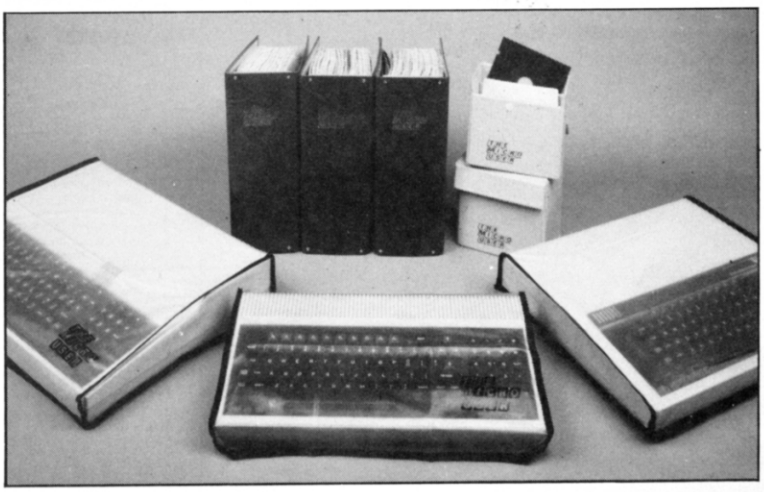

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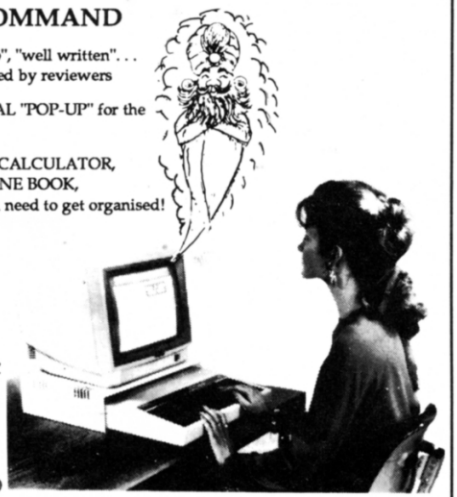

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Delta 14B single	11.26	12.95
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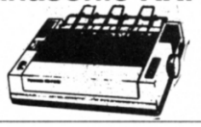
Panasonic KXP1081



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KXP1080 Fabric Ink ribbon	4.26	4.90
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	Ex VAT	Inc VAT
Panasonic KXP3131 Daisy	233.91	269.00
Epson FX1000	400.00	460.00
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IBM/Archimedes cable	6.00	6.90
LX800 Sheet Feeder	62.61	72.00
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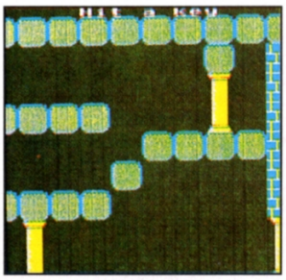
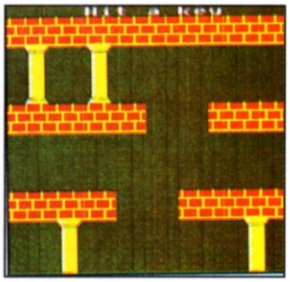
```
e to Z88",6)
  860 PRINT TAB(2,8) CHR$(131);"BBC:";fi
le$
  870 PRINT TAB(2,11) CHR$(131);"(Press
RETURN for ";file$;")"
  880 PRINT TAB(2,9) CHR$(131);"Z88:";:I
NPUT "" resp$
  890 IF resp$<>"" THEN file$=resp$
  900 PRINT TAB(7,9) file$;SPC(6)
  910 CALL z88:PROCsynch
  920 ?&80=27:CALL send
  930 ?&80=ASC"S":CALL send
  940 PROCstring("N",file$,1)
  950 REPEAT
  960 ?&80=BGET#H%:IF ?&80<128 AND ?&80>
31 THEN CALL send:GOTO 1030
  970 IF ?&80=9 OR ?&80=10 OR ?&80=13 TH
EN CALL send:GOTO 1030
  980 byte%=?&80
  990 ?&80=27:CALL send
 1000 ?&80=ASC"B":CALL send
 1010 ?&80=ASC(STR$~(byte% DIV 16)):CALL
 send
 1020 ?&80=ASC(STR$~(byte% MOD 16)):CALL
 send
 1030 UNTIL EOF#H%
 1040 ?&80=27:CALL send:?&80=ASC"Z":CALL
 send
 1050 ?&80=27:CALL send:?&80=ASC"Z":CALL
 send
 1060 CLOSE#H%:GOTO 240
 1070 :
 1080 REM  get Z88 file
 1090 PROCstring("N",device$+dir$,0)
 1100 I%=0
 1110 REPEAT
 1120 CALL dev:I%=I%+1:list$(I%)=$name%
 1130 UNTIL $name%=""
 1140 PROCmenu(device$+dir$+" Select fil
e",I%-1,1)
 1150 IF action%=1 THEN GOTO 240
 1160 file$=list$(action%-1)
 1170 CALL key:VDU28,0,24,39,3,12,26
 1180 VDU31,0,6:PROCborder("Transfer fil
e to BBC",6)
 1190 PRINT TAB(2,8) CHR$(131);"Z88";dev
ice$;dir$;file$
 1200 K%=LEN(file$):FOR I%=1 TO K%
 1210 IF MID$(file$,I%,1)="." THEN K%=I%
 1220 NEXT
 1230 A%=0:Y%=0:IF (USR(&FFDA) MOD 256)=
4 THEN max%=7 ELSE max%=10
 1240 IF K%>max% THEN K%=max%
 1250 bbc$=LEFT$(file$,K%)
 1260 PRINT TAB(2,11) CHR$(131);"(Press
RETURN for ";bbc$;")"
 1270 PRINT TAB(2,9) CHR$(131);"BBC:";:I
NPUT "" resp$
 1280 IF resp$<>"" THEN bbc$=resp$
 1290 PRINT TAB(7,9) bbc$;SPC(10)
 1300 H%=OPENOUT bbc$
 1310 CALL z88:PROCstring("G",device$+di
r$+file$,0)
 1320 CALL rec:IF ?&80<>27 THEN BPUT#H%,
?&80:GOTO 1320
 1330 CALL rec:IF ?&80=ASC"Z" THEN CLOSE
#H%:GOTO 240
 1340 CALL rec:byte1%=?&80-48:IF byte1%>
9 THEN byte1%=byte1%-7
 1350 CALL rec:byte2%=?&80-48:IF byte2%>
9 THEN byte2%=byte2%-7
 1360 BPUT#H%,(byte2%+16*byte1%):GOTO 13
20
 1370 :
 1380 DEF PROCoscli($command)
 1390 LOCAL X%,Y%
 1400 X%=command MOD 256:Y%=command DIV
256
 1410 CALL &FFF7:ENDPROC
 1420 :
 1430 DEF PROCstring(A$,B$,type%)
 1440 IF type%=0 THEN PROCsynch
 1450 ?&80=27:CALL send
 1460 ?&80=ASC(A$):CALL send
 1470 FOR I%=1 TO LEN(B$)
 1480 ?&80=ASC(MID$(B$,I%,1)):CALL send
 1490 NEXT
 1500 ?&80=27:CALL send
 1510 IF type%=1 THEN?&80=ASC"F":CALL se
nd ELSE ?&80=ASC"Z":CALL send
 1520 ENDPROC
 1530 :
 1540 DEF PROCmenu(title$,no%,pos%)
 1550 IF pos%>no% THEN pos%=no%
 1560 CALL key:CLS
 1570 PRINT CHR$(132);CHR$(157);CHR$(131
);CHR$(141);SPC(8);"BBC / Z88 LINK II";S
PC(10);CHR$(156);
 1580 PRINT CHR$(132);CHR$(157);CHR$(131
);CHR$(141);SPC(8);"BBC / Z88 LINK II";S
PC(10);CHR$(156);'
 1590 depth%=(no%+6)/2:IF depth%>18 THEN
 depth%=18
 1600 PROCborder(title$,depth%)
 1610 page%=0
 1620 bot%=page%*32:top%=no%:IF top%>32*
page%+31 THEN top%=32*page%+31
 1630 FOR I%=bot% TO top%
 1640 VDU31,4+(18*(I% MOD 2)),6+((I%-bot
%) DIV 2):PRINT CHR$(131);LEFT$(list$(I%
),14);
 1650 NEXT
 1660 REPEAT
 1670 xp%=18*(pos% MOD 2):yp%=(pos%-32*p
age%) DIV 2
 1680 VDU31,2+xp%,6+yp%:PRINT CHR$(132);
CHR$(157);CHR$(131);LEFT$(list$(pos%),14
);TAB(17+xp%,6+yp%);CHR$(156);
 1690 X%=GET
 1700 IF X%>135 AND X%<140 THEN VDU31,2+
xp%,6+yp%:PRINT "  ";CHR$(131);LEFT$(lis
t$(pos%),14);TAB(17+xp%,6+yp%);" ";
 1710 IF X%=136 THEN pos%=pos%-1
 1720 IF X%=137 THEN pos%=pos%+1
 1730 IF X%=138 THEN pos%=pos%+2
 1740 IF X%=139 THEN pos%=pos%-2
 1750 IF pos%<0 THEN pos%=0
 1760 IF pos%>no% THEN pos%=no%
 1770 IF pos% DIV 32<>page% THEN X%=13
 1780 UNTIL X%=13
 1790 IF pos% DIV 32<>page% THEN page%=p
os% DIV 32:VDU28,3,21,36,6,12,26:GOTO 16
20
 1800 action%=pos%+1
 1810 CALL z88:ENDPROC
 1820 :
 1830 DEF PROCborder(head$,len%)
 1840 VDU145,60,44,135:PRINT head$;CHR$(
145);
 1850 FOR I%=1 TO 33-LEN(head$):VDU44:NE
XT
 1860 PRINT CHR$(108)
 1870 FOR I%=1 TO len%:PRINT CHR$(145);C
HR$(53);TAB(37);CHR$(145);CHR$(106):NEXT
 1880 VDU145,45
 1890 FOR I%=1 TO 36:VDU44:NEXT
 1900 VDU46
 1910 ENDPROC
 1920 :
 1930 DEF PROCassemble
 1940 DIM name% 600
 1950 DIM code% 250
 1960 osrdch=&FFE0:oswrch=&FFEE:osbyte=&
FFF4:osgbpb=&FFD1:osfile=&FFDD
 1970 FOR pass=0 TO 2 STEP 2
 1980 P%=code%
 1990 [
 2000 OPT pass
 2010 .send
 2020 LDA &80:JSR oswrch
 2030 JSR osrdch:STA &81
 2040 RTS
 2050 .rec
 2060 JSR osrdch:STA &80
 2070 LDA #0:JSR oswrch
 2080 RTS
 2090 .dev
 2100 LDX #0
 2110 JSR osrdch
 2120 CMP #27:BNE second
 2130 LDA #0:JSR oswrch
 2140 JSR osrdch
 2150 .second
 2160 CMP #ASC"N":BNE endword
 2170 LDA #0:JSR oswrch
 2180 .getloop
 2190 JSR osrdch
 2200 CMP #27:BEQ endword
 2210 STA name%,X
 2220 INX
 2230 LDA #0:JSR oswrch
 2240 JMP getloop
 2250 .endword
 2260 LDA #0:JSR oswrch
 2270 LDA #13:STA name%,X
 2280 RTS
 2290 .key
 2300 LDA #3:LDX #0:LDY #0:JSR osbyte
 2310 LDA #2:LDX #0:LDY #0:JSR osbyte
 2320 RTS
 2330 .z88
 2340 LDA #3:LDX #7:LDY #0:JSR osbyte
 2350 LDA #2:LDX #1:LDY #0:JSR osbyte
 2360 RTS
 2370 .con
 2380 EQUB 0:EQUD name%:EQUD 48:EQUD 0
 2390 .conad EQUW con
 2400 .bbcfiles
 2410 LDA #(name% MOD 256):STA con+1:LDA
#(name% DIV 256):STA con+2:LDA #48:STA c
on+5:LDA #0:LDX #7:.loop STA con+5,X:DEX
:CPX #0:BNE loop
 2420 LDA #8:LDX conad:LDY conad+1
 2430 JSR osgbpb
 2440 RTS
 2450 .block
 2460 EQUD name%:EQUD 0:EQUD 0
 2470 .coblock EQUW block
 2480 .ftype
 2490 LDA #5:LDX coblock:LDY coblock+1
 2500 JSR osfile:STA &80
 2510 RTS
 2520 ]
 2530 NEXT:ENDPROC
 2540 :
 2550 DEF PROCsynch
 2560 VDU5,5,5,5,5,6
 2570 FOR I%=1 TO 6
 2580 K%=INKEY(100):IF K%=6 THEN I%=6
 2590 IF K%<0 THEN ENDPROC
 2600 NEXT
 2610 IF K% <> 6 THEN GOTO 2560
 2620 ENDPROC
 2630 :
 2640 DATA Quit,"Z88 Device","* command"
,"Z88 Dir","BBC File","Z88 File"
```

THE MICRO USER MAIL ORDER OFFERS

Write your own arcade smashes using the

ARCADE GAME *Creator*



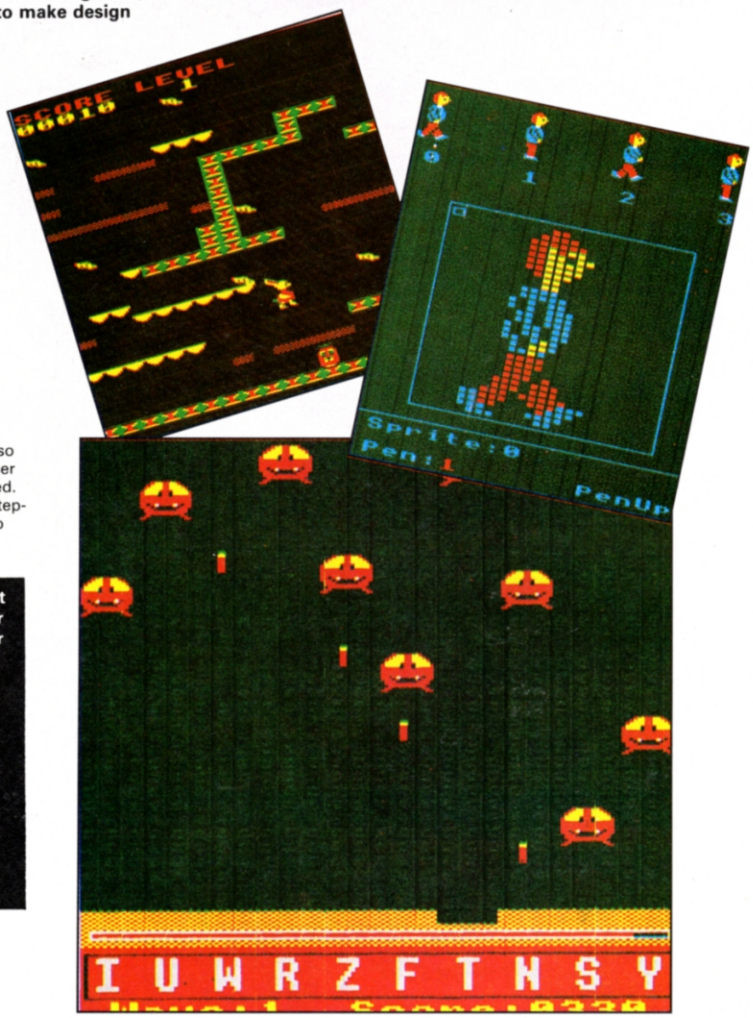


Arcade Game Creator is a suite of programs for the BBC Micro or Electron. Taken from the pages of *Electron User*, it lets you into the secrets of writing fast-action arcade games, and provides you with a number of utilities to make design and programming easier.

Among the programs are:

- A Mode 5 sprite editor for designing your own multi-coloured characters.
- A selection of fast print routines that will move sprites both in front or behind other objects on the screen.
- Map generators that will squeeze a Mode 5 screen into 8 bytes!
- Scrolling maps.
- Score update and printing routines.

. . . and much, much more.



To accompany the Arcade Game Creator we are also making available the six back issues of Electron User (February to July 1988) in which the series appeared. Clearly written without any jargon, they take you step-by-step from the basics of game design, right up to producing fully-fledged programs.

If you thought Electron programs would not work correctly on a BBC Micro, you're in for a surprise. In addition to the Arcade Creator suite of programs, all the following programs in the *Electron User* bundle will also work on your BBC Micro.

Features: Printer benchmark test, using View for Programming, Pascal tutorial, a home brew kit, Viewsheet tutorial, machine code beginners' tutorial, entertaining 10-Liner programs, Rainbow art package, machine code maths routines and a car route database.

Arcade games: Randall Rabbit, Bomb Alert, Navigator, Super Digga, Shove Penny, Go Pig and Keyboard Gremlins.

Educational games: Odd One Out, Hiss, Dozer, Disorder, Lion's Lair and Tilley the Train.

If you are an aspiring games programmer, this is an offer you simply cannot afford to miss!

Arcade Game Creator

Tape + magazine bundle	**£9.95**
Disc + magazine bundle	**£10.95**

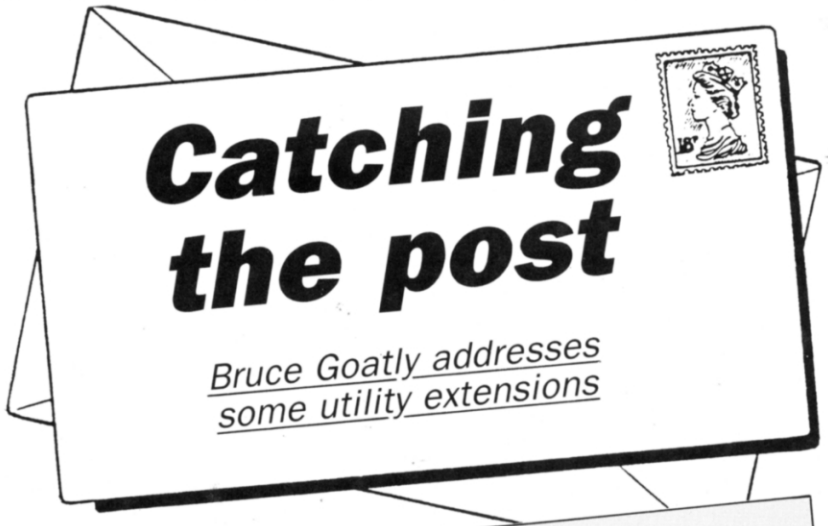
The *Micro User* team has been through all these programs in detail, ensuring they work correctly and make the best use of the BBC Micro's greater power.

TO ORDER PLEASE USE THE FORM ON PAGE 135

B B+ hm

Catching the post

Bruce Goatly addresses some utility extensions



THERE has been a lot of interest in our Address Book programs – published in *The Micro User* in August 1987, with extra notes following in the October Letters pages – and in response to a few queries here are some tips and a couple of programs to help you get the most from this utility. Absolutely crucial is that when you set up the programs the ADDRESS file must be the last one on the disc – starting at a higher sector number than anything else.

This will have been done automatically if you started with a fresh disc, copied Design and Addrbk on to it and then ran Design to generate the BOXES and ADDRESS files.

If there is anything on the disc beyond the ADDRESS file then at some stage you'll get a *Can't extend* error while adding a record. This will almost certainly corrupt the one that was in the process of being added and may lead to future errors during searches, although more records can be added once the blocking file has been removed.

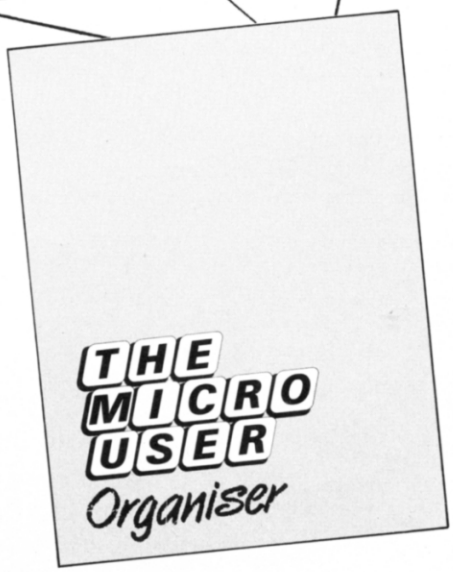
If you have found that during a search the screen clears and the program reruns itself you have an ADDRESS file in need of repair and should use Addrep – Listing I.

It works by searching through the file from the beginning and deleting any record that generates an error, then restarting the search from the beginning of the file.

The space left where records were deleted can then be reused without further error. To use Addrep, copy it and the broken ADDRESS file to a fresh disc and run it. Faulty records will be reported as they are deleted. For safety, test the repaired ADDRESS file thoroughly on a backup disc – you do keep one, don't you? – before

Turn to Page 82 ▶

THE MICRO USER Organiser



The Address Book and Design programs have been included on this month's *Micro User* disc.

Listing I: The repair program

```
   10 REM Address Book repair program
   20 REM by Bruce Goatly
   30 REM (c) The Micro User
   40 X%=OPENUP"ADDRESS":N=BGET#X%:nr=BG
ET#X%+256*BGET#X%
   50 dr%=BGET#X%+256*BGET#X%:PTR#X%=7
   60 lr=5:FORY%=1TON:lr=lr+(BGET#X%)+2:
NEXT
   70 FORY%=0TON:INPUT#X%,dummy$:NEXT:os
=PTR#X%
   80 ONERRORPROCerror:GOTO90
   90 FORr=1TOnr
  100 PTR#X%=FNptr:INPUT#X%,del%
  110 IFdel%=0:FORY%=1TON:INPUT#X%,dummy
$:NEXT
  120 NEXT:PRINT""Address file restored.
"
  130 CLOSE#X%
  140 END
  150 :
  160 DEFFNptr=os+lr*(r-1)
  170 :
  180 DEFPROCerror
  190 IFERR=17 REPORT:CLOSE#X%:END
  200 PRINT"Record no. ";r;" corrupt: DE
LETED."
  210 PTR#X%=3:BPUT#X%,r MOD256:BPUT#X%,
r DIV256
  220 PTR#X%=FNptr
  230 IFdr% PRINT#X%,dr% ELSEPRINT#X%,&F
FFF
  240 dr%=r
  250 ENDPROC
```

Get it right!

10 =	0	0	140 =	FD2E	9
20 =	0	0	150 =	9719	0
30 =	0	0	160 =	DEA8	B
40 =	F761	1	170 =	9719	B
50 =	FE31	5	180 =	D7A7	3
60 =	6A3B	5	190 =	692F	4
70 =	E9A8	6	200 =	7D45	0
80 =	5ACF	6	210 =	65B9	D
90 =	58DA	9	220 =	8B42	4
100 =	37B5	E	230 =	8CE8	D
110 =	3A9C	3	240 =	7FED	2
120 =	5E36	5	250 =	ED0F	2
130 =	7733	D			

◀ *From Page 81*

copying it to your master Address Book disc.

The second tip is, as T.M. Warrilow pointed out in the Letters column in the February issue, there must be no gaps between any of the files on the disc to avoid problems with the *Select to disc* option. *COMPACTing your disc before running Addrbk for the first time will nip this in the bud.

Tip number three: If you want to keep a SELECT file for later use, copy it to another disc and give it – using *RENAME – a more meaningful name on that disc. Otherwise you will lose it because Addrbk deletes SELECT on the Address Book disc every time it is run.

The fourth point relates to forward planning: Second thoughts can happen to anyone. After using the program for a while you may well want to redesign the layout or include extra categories without starting from scratch. The program Reform – Listing II – will let you do this by reformatting an existing ADDRESS file. To use Reform follow these steps:

- Start with a fresh, empty disc which we'll call the reformatting disc.
- Load the program Design, amend it by deleting line 180 and changing the filename ADDRESS in line 330 to NEWCORE, and save it to the reformatting disc.
- Type in and save the program Reform, using the checksums to ensure there are no errors. Put a copy on the reformatting disc.
- Copy your BOXES and ADDRESS files to the reformatting disc.
- Run the modified Design program and alter the layout to your satisfaction. Note that if you shorten a field the reformatted information will be cut short to fit and Design will not let you delete fields.
- Press Escape to generate an altered BOXES file and a modified core address file called NEWCORE.
- Run Reform and wait: You will be kept informed of progress. If the original ADDRESS file occupies more than half the available disc space there may not be enough room for the new file NEWADDR to be built up on the disc. If you have more than one drive you can get round this by specifying a different drive for the new file.
- Test the redesigned ADDRESS and BOXES files on your backup disc before copying them to your master disc.

That should be enough to let you make even better use of Address book. If you have any ideas to improve it even more let us know.

Listing II: The reformatting program

```
   10 REM Address Book reformatter
   20 REM by Bruce Goatly
   30 REM (C) The Micro User
   40 ONERRORCLOSE#0:REPORT:PRINT" @ ";E
RL:END
   50 MODE7
   60 X=OPENUP"NEWCORE":IFX=0 PRINT"No c
ore file":END
   70 N1=BGET#X:DIM L1 N1,L1$(N1)
   80 PTR#X=6:lr1=-1
   90 FORx=0TON1:L1?x=BGET#X:lr1=lr1+L1?
x+2:NEXT
  100 FORx=0 TON1:INPUT#X,L1$(x):NEXT
  110 os1=PTR#X
  120 CLOSE#X
  130 VDU23,1,0;0;0;0;
  140 Y=OPENOUT"TEMP"
  150 X=OPENUP"ADDRESS":N2=BGET#X:BPUT#Y
,N1
  160 DIML2 N2,L2$(N2)
  170 nr2=BGET#X+256*BGET#X:BPUT#Y,nr2 M
OD256:BPUT#Y,nr2 DIV256
  180 FORx=3TO4:A=BGET#X:BPUT#Y,A:NEXT
  190 dummy=BGET#X:BPUT#Y,os1
  200 FORx=0TON1:BPUT#Y,L1?x:NEXT
  210 FORx=0TON1:PRINT#Y,L1$(x):NEXT
  220 lr2=-1:FORx=0TON2:dummy=BGET#X:lr2
=lr2+dummy+2:NEXT
  230 FORx=0TON2:INPUT#X,L2$(x):NEXT
  240 os2=PTR#X:r=0
  250 FORx=7TO8
  260 PRINTTAB(9,x)CHR$141"Total records
: ";nr2;TAB(6,x+3)CHR$141"Reformatting r
ecord"
  270 NEXT
  280 REPEAT
  290 FORx=10TO11:PRINTTAB(27,x);r+1;:NE
XT
  300 IFN1>N2 PROCmore ELSEPROClesseq
  310 r=r+1
  320 UNTILr=nr2
  330 CLOSE#0
  340 CLS:PRINTTAB(7,7)"Reformatting com
plete"
  350 *DELETE ADDRESS
  360 *RENAME TEMP ADDRESS
  370 VDU23,1,1;0;0;0;
  380 END
  390 :
  400 DEFPROCmore
  410 INPUT#X,A%:PRINT#Y,A%
  420 FORx=1TON2:INPUT#X,A$:IFLENA$>L1?x
 PROCtrunc
  430 IFLENA$<L1?x PROCpad
  440 PRINT#Y,A$:NEXT
  450 FORx=N2+1TON1:PRINT#Y,STRING$(L1?x
," "):NEXT
  460 ENDPROC
  470 :
  480 DEFPROClesseq
  490 PTR#X=os2+r*lr2
  500 INPUT#X,A%:PRINT#Y,A%
  510 FORx=1TON1:INPUT#X,A$:IFLENA$>L1?x
 PROCtrunc
  520 IFLENA$<L1?x PROCpad
  530 PRINT#Y,A$:NEXT
  540 ENDPROC
  550 :
  560 DEFPROCtrunc
  570 A$=LEFT$(A$,L1?x)
  580 ENDPROC
  590 :
  600 DEFPROCpad
  610 A$=A$+STRING$(L1?x-LENA$," ")
  620 ENDPROC
```

Get it right!

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 4E36 6
  50 = 8AFC A
  60 = 2962 5
  70 = 692B D
  80 = 5A3F 1
  90 = AEF2 8
 100 = EBD1 C
 110 = 9E7C F
 120 = 734D 5
 130 = 1E64 5
 140 = 8C02 A
 150 = 4737 D
 160 = 204D 0
 170 =   C0 A
 180 = D4EA F
 190 = B56A E
 200 = 4945 8
 210 = BF4B 2
 220 = DCD8 9
 230 = AAA2 9
 240 = 5358 8
 250 = 2FD6 0
 260 = 8DC6 8
 270 = 2C83 D
 280 = BFBA E
 290 = BE5C E
 300 = 79A4 8
 310 =  66C C
 320 = 6BD5 D
 330 = 9EE3 D
 340 =  16B 0
 350 = EB89 E
 360 = CE54 B
 370 = 59B7 8
 380 = FD2E B
 390 = 9719 1
 400 = 1414 9
 410 = EF2C D
 420 = 5FE1 4
 430 = EEC8 5
 440 = 8330 4
 450 = 1E9C D
 460 = ED0F 6
 470 = 9719 3
 480 = 8312 B
 490 = 94D7 B
 500 = EF2C 8
 510 = 913D 7
 520 = EEC8 3
 530 = 8330 6
 540 = ED0F 3
 550 = 9719 D
 560 = CD1D A
 570 = DD2A A
 580 = ED0F 0
 590 = 9719 5
 600 = A88C 7
 610 = B535 3
 620 = ED0F 3
```

Better saved than sorry

John Tissandier's routine backs up your files automatically

SOMETHING you learn very early on when using a micro is the need to make a backup of your files – preferably on a different disc. Here's a utility to do this automatically on a second disc surface when either the SAVE or *SAVE commands are issued. It works from Basic and also with application programs like Wordwise-Plus, Inter-Word, and Mini Office II.

Type in the listing – the source code – and check you have made no typing errors using Get it Right! Save and run it, and the utility will install and also cause the machine code to be saved as ABU. So on future occasions it can be installed with the command *ABU – which could be part of a !BOOT file.

From then on any work you save without naming the drive as part of the filename will be output to both drives 0 and 1. You can override the facility by specifying the drive in the usual manner. So, for example:

```
SAVE ":0.fname"
```

will only save *fname* on drive 0.

Now let's look at some possible modifications you may want to make to the utility to tailor it to your needs. If you look at the source code you'll see a procedure called PROCuser. The parameters – such as the drives used for the first and second saves – can be changed as required. Also, if you've got a double-sided single disc drive you can make use of the utility by setting the drives to 0 and 2.

The variable *zero* is the start address of the first of four bytes required in zero page, and *code* is the start address of the machine code. These values can be modified, as the code has been written to be relocatable.

You may need various versions of the utility, so *mc$* – the filename of the machine code – can be altered to make it easier to keep track of them.

Originally this utility was developed using the Watford Electronics DFS. Given that it only uses legal operating system calls, it should have worked with the Acorn DFS. Unfortunately it didn't, because the latter's SAVE routine overwrites certain parameters that are initially setup when a SAVE or *SAVE instruction is issued.

Two versions of the utility can be assembled using conditional assembly. If the user parameter *dfs$* is assigned the value WATFORD then a version suitable only for the Watford Electronics DFS or DDFS will be assembled. This has the advantage of occupying less memory. Any other value for *dfs$* will assemble a longer version suitable for the Acorn, Solidisk or, indeed, Watford DFS.

The final user parameter *break$* controls the action of the Break key.

The utility works by changing the address in *filev*, and as pressing Break normally resets all vectors, although the code will still be in place *filev* will no longer point to it. To get round this problem the utility programs the Break key to re-insert the correct values when pressed:

```
?&212=lo-byte
?&213=hi-byte
```

The actual values of lo–byte and hi–byte that appear on the screen will depend on where in memory the code was assembled.

Note that pressing Break when using an application program like Wordwise-Plus will cause problems. This is because the Wordwise-Plus command line interpreter will not be able to handle the Basic query indirection operators shown above. The solution is to produce a special version of ABU for use with such packages.

Two choices are possible. One is to set *break$* equal to *b3$*. This will program the Break key to

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HOW THE ROUTINE WORKS

The operating system call to save a complete file is *osfile*, and the entry point is &FFDD. Disassembling the code at &FFDD reveals:

```
JMP (&0212)
```

That means the call goes through an indirection vector at &212, which contains the actual address of the code where the SAVE command is interpreted. This address can be printed out using:

```
PRINT ~(!&212 AND &FFFF)
```

On my system this produces &FF1B. If you change the filing system with *TAPE and repeat the above command, you'll find the operating system has inserted a different address in the vector. The original address can be re-inserted with *DISC.

The existence of this vector *filev* makes it possible for you to intercept the *osfile* call by replacing the address in the vector with the address of another routine – just as the operating system does with *TAPE. The user routine can either totally replace the operating system routine or return to it after carrying out its own business. In order to return control to the *osfile* routine the original address in the vector must be saved at the start of the user routine and used at its termination.

POSSIBLE PROBLEMS

If you have any trouble the following points may help:

- Are you using the correct program version for your DFS?
- The source code or machine code should be run once only. This is because running it a second time will cause the program to find the address of the user routine in *filev* instead of the original operating system address, and the whole thing will start going round in circles. The solution is to press Control+Break and start again.
- Pressing Control+Break will disable the utility.

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*RUN the utility again, so to work correctly the machine code version of the utility must be present on the current drive.

Alternatively, *break$* can be set equal to *b1$*. This will make the Break key behave normally which may be necessary in some cases where it is intended to enter a rom package and *RUN the utility all from a !BOOT file.

Note that the Watford version with normal Break key action requires 174 bytes and the Acorn version with Break key set to restore the vector requires 233 bytes. Other variations will lie in between these extremes.

So now you can save your files to two disc surfaces without entering the filename twice and be sure that, when things go wrong, you've still got a copy of that important program.

For those interested in finding out exactly how the program works, the breakdown is as follows:

Lines 630 to 640: The original address in *filev* is stored in *oldvec*. Osfile performs different actions depending on the value in the accumulator and we are interested in A=0 – save a block of memory as a file. This is checked at line 780 and if A<>0 control is returned to the operating system and the user routine exited completely with an indirect jump at line 1400 using *oldvec*. This is the normal way of dealing with vectors.

However, if A=0 and control passes to the utility a different technique must be used because osfile has to be called twice – once for a normal save and again for a backup. Hence after osfile control must return to the user routine.

To do this we use a JSR instruction, rather than a JMP, but with this indirect addressing is not available. Therefore, we are forced to employ a more messy method.

Note that the two JSR instructions at lines 1110 and 1270 have dummy addresses and, during the first pass of the assembly, this ensures two bytes are reserved. On the second pass the low and high bytes of the address in *filev* are inserted in the correct places in the code. On my system the two lines become:

```
JSR &FF1B
```

Lines 670 to 680: The start address of the user vector routine indicated by the label *start* is inserted into *filev*.

Line 700: Exit assembly temporarily to check if Break key is to be programmed.

Line 730: The RTS. Note that when the code is executed with CALL init, this is as far as it goes. It is only issuing an osfile call like SAVE or *SAVE which will trigger off the main part of the code which begins at *start*.

Line 810: The *X* and *Y* registers are stored. These point to a parameter block used by osfile. There is no need to do the same with the value in the accumulator since we know it is zero.

Line 830: Exit assembly temporarily to check whether it is necessary to save the osfile parameter block corrupted by some DFSs.

Lines 870 to 940: The escape route to prevent you invariably having to save twice. The routine here checks for the drive being specified by comparing the first byte of the filename with &3A – the Ascii code for colon. If it is the routine branches to *normal–save*.

Lines 970 to 1000: Before proceeding any further the current drive is stored because the strategy employed by the utility is to make calls to oscli to change the drive before saving.

Lines 1020 to 1110: The real business of the routine is very straightforward. The drive is changed to *first–drive,* the registers restored and a call made to *osfile*.

Lines 1130 to 1270: Nearly the same as above except that the drive is changed to *second–drive* and the *osfile* parameter block restored if not using a Watford DFS.

Lines 1300 to 1350: The original drive is restored and the routine exited.

Lines 1430 to 1440: Since the registers are restored in three places a sub-routine is used.

Lines 1460 to 1780: Data section – see also PROCbreak–data.

Lines 1950 to 2130: The Acorn DFS overwrites the last eight bytes of the osfile parameter block so the wrong data would be present when the utility attempted the second save.

The solution is to save the parameter block in a safe area of memory and restore it before the second save is attempted. As a precaution, all 18 bytes of the block are saved.

Lines 2240 to 2420: These functions make the code compatible with Basic I.

```
  10 REM Automatic Backup Utility
  20 REM (c) The Micro User
  30 REM John Tissandier
  40 :
  50 MODE 1
  60 PROCuser
  70 PROCtitle_page
  80 PROCassemble
  90 PROCsave
 100 COLOUR 3:PRINT""Utility enabled"
 110 END
 120 :
 130 DEF PROCuser
 140 first_drive=0
 150 second_drive=1
 160 zero=&70
 170 code=&A00
 180 mc$="ABU"
 190 :
 200 REM If using Watford Electronics D
FS set dfs$ to "WATFORD"
 210 dfs$="ACORN"
 220 :
 230 b1$="No action"
 240 b2$="Reset vector"
 250 b3$="*RUN utility"
 260 REM Select BREAK key action by mak
ing break$ equal to b1$, b2$ or b3$
 270 break$=b2$
 280 ENDPROC
 290 :
 300 DEF PROCtitle_page
 310 COLOUR 1:PRINT""A";
 320 COLOUR 3:PRINT "utomatic ";
 330 COLOUR 1:PRINT "B";
 340 COLOUR 3:PRINT "ackup ";
 350 COLOUR 1:PRINT "U";
 360 COLOUR 3:PRINT "tility"
 370 PRINT STRING$(24,"=")
 380 PRINT""For ";
 390 COLOUR 1:PRINT dfs$;
 400 COLOUR 3:PRINT" Disc Filing System
"
 410 PRINT""BREAK key action = ";
 420 COLOUR 1:PRINT break$
 430 COLOUR 3:PRINT""First drive  = ";
 440 COLOUR 1:PRINT ;first_drive
 450 COLOUR 3:PRINT "Second drive = ";
 460 COLOUR 1:PRINT ;second_drive
 470 COLOUR 3:PRINT""Zero page usage =
";
 480 COLOUR 1:PRINT "&";~zero;"-&";~zer
o+3
```

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Go Forth and experiment

THE BEEB BODY BUILDING COURSE

Mike Cook shows how to handle the outputs on his interface board

WE looked last month at the detailed circuitry of the Experimenter's Board: Now let's see how to handle output commands to it. But before we do that I must explain a slight change I have made to the circuit. I have added an extra shorting link – designated imaginatively Link 4 – to remove the common zero volts line from the bar LED display.

The reason for the mod is that driving the LEDs directly from the printer port makes the output voltage sag a little. While this does no harm, if you want to drive something a little more fussy about its input voltage, removing this link permits you to do so. You will, of course, not see the LEDs lit up when it is removed.

Well now on to this month's experiment and, as promised, it is presented in both Basic and Forth, so first let's see what needs to be done. The user VIA in the BBC Micro is divided into two similar sides – known, again imaginatively, as side A and side B. Side A is labelled the printer port and side B the user port.

On the Experimenter's Board the printer port – side A – is used exclusively for outputs because the BBC Micro has output buffers to drive a printer. We can't send a signal back through them into the VIA because, although the side B VIA could theoretically be used as an input, it's made impossible by the way the micro is constructed.

The power up sequence initialises side A of the VIA to be outputs, so we don't need to do it again here and can use side A of the VIA as eight data output lines.

Now, in computing we always number things starting with zero, so our eight output lines will be numbered 0 to 7. As far as we are concerned they are totally separate – all go to the bar display and the first four also go to the relays. However, the micro deals with eight bits at a time – that's why it is known as an 8 bit micro – so when trying to output anything we need to specify the state of all eight.

The VIA is a memory mapped device, which means that certain locations in the micro correspond to certain registers – or parts – in the VIA. On the BBC Micro the user VIA occupies 16 address locations between &FE60 and &FE6F. These are in hexadecimal notation which, despite the protests from beginners, is actually easier to cope with than decimal numbers.

The & specifies the hexadecimal notation and should be read as the hexadecimal value. To

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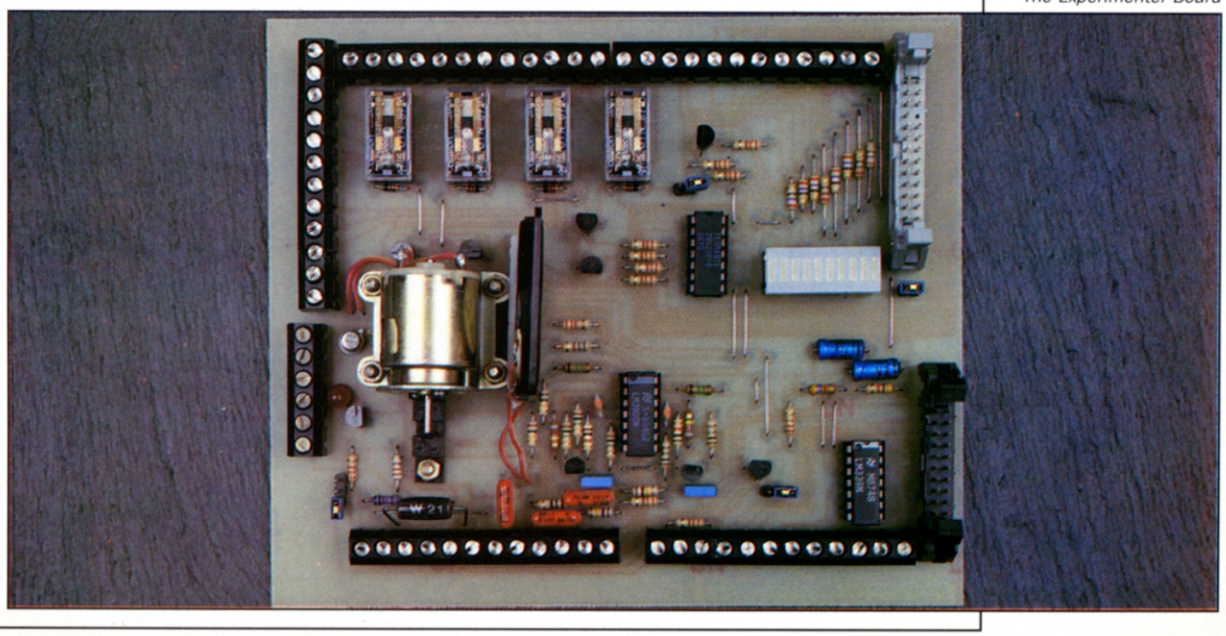
The Experimenter Board



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output something to the VIA's side A we need to store the required bit pattern of on and off bits in address &FE6F. We can also use address &FE61 for this, but at the moment let's reserve that address for later work on handshaking.

So we need to specify all eight bits when changing the state of the outputs. The most convenient way is by converting the bit pattern of on and off bits into a number. If a bit is to be on it makes a contribution to the value equal to 2 raised to the power of the bit number. Now that sounds ghastly but it is really very simple – if we want to turn on bits 1 and 2 the number we must write to the port is:

$$2^1 + 2^2 = 2 + 4 = 6$$

So to turn bits 1 and 3 on and all the other bits off we need to store the number 6 in address &FE6F:

IN BASIC this is done with the indirection operator ? which should be read as *the contents of*. Read in this way the operation becomes quite simple:

```
?&FE6F=6
```

You read this as: *Let the contents of hexadecimal address FE6F equal 6.*

IN FORTH the ! – pronounced pling – takes the number on the top of the stack as an address to store the number which is second, removing them both from the stack. In many versions of Forth – including Acorn's – the ! uses two-byte numbers, so to store just a single byte you must use the C! operator.

Also in Forth you can switch to hexadecimal notation using the HEX command, so assuming you are already using this notation, the sequence becomes simply:

```
6 FE6F C!
```

This interprets as: *Put 6 on the stack, put FE6F on the stack, store the number.*

One simple program you could try is to display a binary count on the LED bar – this just generates the numbers one at a time and stores them at the output register. In this way you will see an increasing binary count on the bar display. Of course, any micro worth its salt will do this so fast that we will perceive that all the LEDs are permanently on.

To see the actual count progressing we will have to put a delay between changing each number. A program to do this in Basic is shown in Program I – you can contrast this with the equivalent Forth word shown in the first nine lines of Program II. To stop the program in either language press Escape or hold down the spacebar as the count changes from 255 to 0.

Most of the time, however, we do not want to specify the states of all the outputs – we want to control one specific bit while leaving the others

```
10 REM BODY BUILDING EXPERIMENT BOARD
20PRINT"COUNTING - SPACE BAR TO STOP"
30REPEAT
40FOR A%=0 TO 255
50PROC_BOUT(A%)
60PROC_DELAY
70NEXT
80UNTIL INKEY(-99)
90END
100DEF PROC_DELAY
110LOCAL B%
120FOR B%=0 TO 1000
130NEXT
140ENDPROC
150DEF PROC_BOUT(V%)
160?&FE6F=V%
170ENDPROC
```

Program I: Basic control of the LEDs

```
  SCR # 1      1 H
0 ( BODY BUILDING EXPERIMENT BOARD )
1 : TASK ;
2 HEX : B.OUT FE6F C! ; DECIMAL
3 : DELAY 2000 0 DO LOOP ;
4 : BIN.COUNT 256 0 DO
5             I B.OUT DELAY
6           LOOP ;
7 : COUNTING BEGIN
8          -99 ?KEY NOT WHILE
9              BIN.COUNT  REPEAT ;
10 HEX : B.OUT.READ FE6F C@ ;
11 : B.ON B.OUT.READ OR B.OUT ;
12 : B.OFF FF XOR B.OUT.READ AND B.OUT ;
13 : B.TOGGLE B.OUT.READ XOR B.OUT ;
14
15 DECIMAL
SCR # 2      2 H
0 ( OUTPUT WORDS )
1 : BIT.POS DUP 0 = NOT IF
2       1 SWAP 0 DO 2 * LOOP
3       ELSE DROP 1
4            THEN ;
5
6 : T.ON BIT.POS B.ON ;
7 : T.OFF BIT.POS B.OFF ;
8 : T.TOGGLE BIT.POS B.TOGGLE ;
9 : WINK 0 B.OUT 10 0 DO
10 0 T.TOGGLE DELAY DELAY DELAY
11                 LOOP
```

Program II:Inverting bits and control of LEDs from Forth

Operation	Mask bit	Result
OR	0	Leave bit unchanged
OR	1	Make bit a logic 1
AND	0	Make bit a logic 0
AND	1	Leave bit unchanged
EOR	0	Leave bit unchanged
EOR	1	Make bit the logic inverse of what it was.

Table 1: The logical operations

Control from the Archimedes

If you have an Archimedes fitted with an input/output podule – or a second processor on your BBC Micro – the simple indirection operation, which I am using for speed, will not work. This is because with these systems the processing occurs where there is no VIA at that address.

In order for you to alter the VIA you have to use the operating system call that will change the memory in the I/O processor. This is achieved through the osword call with the accumulator having a value of 6. To use this the X and Y registers have to be set up to point to a parameter block containing the address to be written to.

This is best achieved by dimensioning a storage space for the block. To do this you need two procedures: One to initialise the block – called once only at the start of the program – and the other to do the transfer. The lines given in Program IV and should be added or used in place of those in Program I.

Similarly Program V should be added to Program III.

contex

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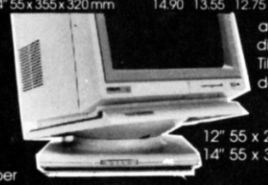

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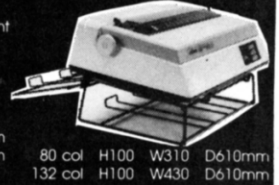

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-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-MICRO MEDIA-

◀ *From Page 86*

unchanged. In order to do this we must first read the current pattern of outputs, change the bit we want and finally write the pattern back to the output port.

Changing of bits is accomplished by the logical operators AND, OR and EXCLUSIVE OR. With these we can turn off, turn on and invert individual bits by having a mask bit pattern or number: the effects of the mask are summarised in Table I. So to change bit 3 we have to generate a mask based on only altering bit 3. For example, from Table 1 you will see that to turn a bit on you need a mask where there is a 1 in bit 3 position and a zero everywhere else. This corresponds to a number 2^3 which is 8. Then you need to OR this mask with what you already have:

IN BASIC turning bit 3 on would be:

```
?&FE6F=?&FE6F OR 8
```

This reads as: *Make the new contents of hexadecimal address FE6F equal to the old contents of hexadecimal address FE6F ORed with the number 8.*

IN FORTH @ fetches a number whose address is on top of the stack. As in the case of the Basic ! operator this gets a two-byte number so C@ is used to get a single byte. This results in:

```
FE6F C@ 8 OR FE6F C!
```

This complicated-looking statement translates simply as: *Put the port address on the stack, fetch the byte at that address, put 8 on the stack, logic OR the top two numbers on the stack, put the port address on the stack and store the number at this address.*

Incidently, inverting a bit is known as toggling it. Program III shows how these operations can be done in Basic, and Program II shows the same thing in Forth. Note that in the Basic program I have exactly mimicked the action of the Forth

```
10 REM BODY BUILDING EXPERIMENT BOARD
20PRINT" WINKING"
30PROC_BOUT(0)
40FOR A%=1 TO 10
50PROC_T_TOGGLE(3)
60PROC_DELAY
70PROC_DELAY
80PROC_DELAY
90NEXT
100END
110DEF FN_FBIT(B%)
120LOCAL C%,D%
130C%=1
140IF B%=0 THEN GOTO 180
150FOR D%=1 TO B%
160C%=C%*2
170NEXT
180=C%
190DEF PROC_T_TOGGLE(B%)
200LOCAL C%,D%
210C%=FN_FBIT(B%)
220D%=?&FE61 EOR C%
230PROC_BOUT(D%)
240ENDPROC
250DEF PROC_DELAY
260LOCAL B%
270FOR B%=0 TO 1000
280NEXT
290ENDPROC
300DEF PROC_BOUT(V%)
310?&FE6F=V%
320ENDPROC
```

Program III: Inverting bits from Basic

program, so you can compare the two languages. To be fair to Basic, I should have really used the exponential function giving a much shorter function:

```
DEF FN_FBIT(B%)=2^B%
```

In order to demonstrate these procedures I have written the programs so that one bar winks five times. Note that there is a part of each program that clears the bar display before winking – this may be changed to put any bit pattern on the display. The designated bar will still wink leaving the other bits unchanged.

Note the way the Forth words are built up: There is a word to read the output then this is used for one to apply the appropriate logic operators and then one to find the value corresponding to a bit label. Finally these are all brought together in the T. words – for example T.ON will turn on any bit whose bit number is on top of the stack.

Remember, Forth words can be executed directly from the keyboard by typing their names. I like to use the full stop in Forth words to separate the different mnemonics that make up the their names.

So far we have just concentrated on looking at the bar display, but if you make Link 1 on the board the relays can be made to turn on and off. These may be used to power anything from lights to motors and, by feeding the right numbers to the output port, these may be made to go on and off in any desired sequence. The essence of control, however, is to have sequences modified by the state of some input, and that is what we shall look at next month.

```
10 REM BODY BUILDING EXPERIMENT BOARD
15PROC_INT
150DEF PROC_INT
160DIM BLOCK% 5
170!BLOCK%=&FE6F
180ENDPROC
190DEF PROC_BOUT(V%)
195LOCAL A%,X%,Y%
200?(BLOCK%+4)=V%
210X%=BLOCK% MOD 256
220Y%=BLOCK% DIV 256
230A%=6
240CALL &FFF1
250ENDPROC
```

Program IV: Archimedes modifications for Program I

```
10 REM BODY BUILDING EXPERIMENT BOARD
15PROC_INT
220D%=FN_PR EOR C%
300PROC_INT
310DEF PROC_INT
320DIM BLOCK% 5
330!BLOCK%=&FE6F
340ENDPROC
350DEF PROC_BOUT(V%)
360LOCAL A%,X%,Y%
370?(BLOCK%+4)=V%
380X%=BLOCK% MOD 256
390Y%=BLOCK% DIV 256
400A%=6
410CALL &FFF1
420ENDPROC
430DEF FN_PR
440LOCAL X%,Y%,A%
450X%=BLOCK% MOD 256
460Y%=BLOCK% DIV 256
470A%=5
480CALL &FFF1
490=?(BLOCK%+4)
```

Program V: Archimedes modifications for Program III

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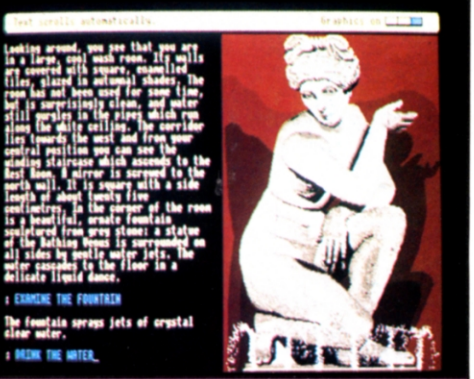

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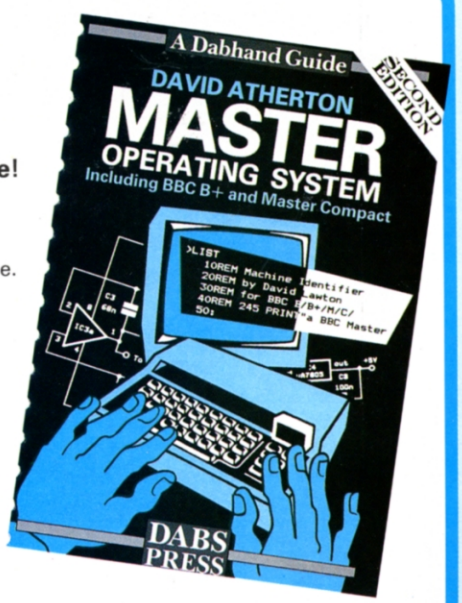

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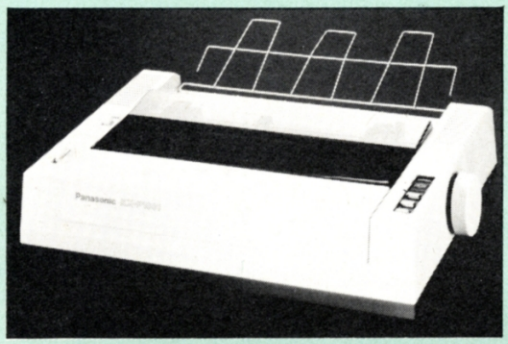

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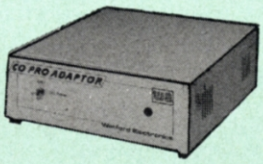

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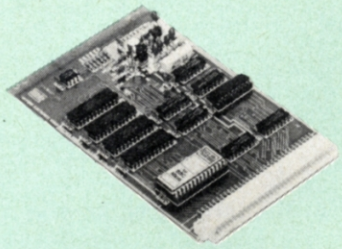

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- Creation of sprites from all or part of a digitised image.
- Saving and loading of digitised images in compressed format.
- Combination of pictures by adding, avaraging, subtracting, multiplication etc.
- Much faster versions of the Arthur *ScreenLoad and *ScreenSave commands.

Software facilities are accessed via operating system star (*) commands and SWI calls. High resolution screen modes using MultiSync type monitors are supported.

UTILITY DISK

A disk is included, containing sample pictures, examples and utility programs including the following:

- Colour image grabbing using colour filters with monochrome or colour cameras, including colour balance adjustment and scaling facilities.
- Pattern editor for 2 colour display modes and printer screendumps.
- 512 line interlaced display for non MultiSync monitors.
- Thresholding to create two colour images.
- Capture and replay of animated sequences.
- Several example programs illustrating the use of digitiser software.

RESOLUTION

Images are digitised to 512 (h) x 256 (v) pixels, and then scaled to fit the Archimedes' screen. It is possible to digitise to 512 x 512 pixels if the picture is stationary for about 0.1 second. 512 x 512 images can either be displayed on a MultiSync monitor, or on a normal monitor using interlacing.

Pictures are digitised to 64 levels of grey (6 bits). Note, however, that it is only possible to display all 64 levels on a monochrome monitor, or a colour monitor which has a composite (CVBS) input. For this reason, the Philips CM8533 monitor is recommended instead of the standard Archimedes monitor. It is also possible to connect both a colour and a monochrome monitor at the same time.

Any 2,16 or 256 colour graphics mode can be used to display digitised pictures. In two colour modes, grey levels are represented using dot patterns, which may be redefined if required (a pattern editor is supplied). **Cont.**

SPEED

Video fields are captured in real time (1/50th sec.), and then transferred to Archimedes' memory or the screen. The grab/display rate is dependant on the screen mode and picture size, up to 25 fields per second for quarter screen images, or 12.5 per second for fullscreen (Mode 9).

HARDWARE

The digitiser is a single width podule, with a BNC socket on the rear panel for the video input, which may optionally be terminated via a link. There is 128K of on-board memory to store the digitised image, and a 32K ROM on the podule contains all the driver software.

Automatic video level control and black level clamping circuitry is used to ensure that the optimum contrast is obtained from a variety of video sources. A filter is included to avoid patterning effects when using colour sources.

Price £249

Watford Electronics are Appointed & Authorised DEALERS / REPAIR CENTRE for Acorn Computers Ltd Microvitec Monitors Panasonic Printers

NEW

BBC PCB DESIGNER

At last! A PCB design package for the BBC Micro that eclipses some industry CAD software. Hard to believe, isn't it? Just look at some of the impressive package specification:

- Library Component Designer
- Component Library (over 200 parts)
- Component List Editor
- NetList Editor
- PCB Board Designer
- Plotter Driver
- Dot Matrix Printer Driver

This integrated suite of programs is packed full of sophisticated PCB related features making the design of a circuit board a dream instead of a nightmare.

Input for the design may be manual or Auto mode.

Some of the PCB Designer's features are:

- Over 120 library pad sizes/shapes
- Four colour adjustable palette
- Zoom range 2:1 to 1:4
- Highlighting of specific tracks
- Normal and surface mounted components
- Rapid screen review
- Menu driven
- Variable gridlock
- Switchable measurement grid
- Pre-select pan/scroll facility
- Large 24" x 24" Board size
- Copy route facility
- Connectivity held at all times
- Ratsnesting of part connections
- Auto-plaement of text references
- Text linked to parts
- Automatic placement of vias
- Printer and plotter outputs provided
- Comprehensive manual

TYPES OF PLOT OUTPUT

Top and bottom track artworks, top and bottom silkscreens, solder resist mask, drilling detail drawing and check plot. All these may be with pad holes on/off, scale of 2:1 or 1:1, board edge on/off, 90 degres rotation, mirror image, width of pen, x & y offsets and batch plots to disc.

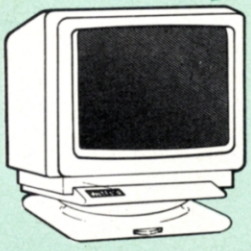
The above is only a taste of the superb features of this software, surely capturing previously unknown performance from the BBC Master computer. BBC B owners will need to fit at least one block of sideways RAM, Shadow screen memory and a disc drive. A trackerball or a mouse is also required.

Introductory Offer: £99

(Please write in for further technical details)

Continued

MONITORS & SWIVEL BASES



All Monitors are supplied complete with BBC connecting leads FREE.

MICROVITEC 14"

- 1431 – Standard resolution as used on the BBC television computer programme **£175**
- 1451 – Medium resolution, suitable for word processing in mode 0 **£219**
- 1441 – High res, exceeds the capabilities of the BBC micro **£359**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£255**
- **2030 CS 20" Med Res** **£380**
- **2040 CS 20" Hi Res** **£675**
- Dust Cover for Microvitecs **£5.50**
- **Touchtec 501 Touch Screen** **£239**

TAXAN 12" & 14"

- **TAXAN Super Vision 2 Type 620** Hi-res RGB Colour monitor. Ideal for Wordprocessing **£263**
- **TAXAN Super 3, Type 625** Ultra Hi-res, RGB Colour) Text mode switch allows monochrome text display in Green, Amber, White reverse or White on Blue **£313**
- **TAXAN 14" Multisync 770 Plus** – An autoscanning Ultra high res, colour monitor. Ideal for Archimedes, IBM & Compatibles **£479**

- **NEC JC-1401P3EE 14"** Multisync Ultra Hi-res Intelligent Colour monitor. Auto scans frequencies between 15KHz to 35KHz. Text switch provides 7 colours for Database & wordprocessor. **£475**

PHILLIPS

BM7502 12" Hi-res Green Monitor	**£65**
CM8833 14" Med. Res Colour Monitor	**£219**
CM8852 14" Med/High Res Colour	**£249**
CM8873 14" High Res Colour Monitor	**£475**

STAR BUY

- **PHILLIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

ONLY £195

Dust Cover for Phillips Monitors **£6**

NEW

SPECIAL OFFER
AMBER MONITOR

BT MERLIN/Acorn 12" Hi resolution Amber monitor. Ideal for wordprocessing. Consealed front panel mounted controls. Illuminated mains on/off rocker switch. Supplied complete with BBC Cable.

Only £49
(Offer valid while stocks last)

N.B. carriage on Monitors **£7** (securicor)

SPARE LEADS

BNC Lead for Zenith or Philips	**£3**
Skart Monitor Lead	**£5**
RGB lead for TAXAN Monitors	**£3**
Archimedes Colour Monitor Lead	**£7.50**

By placing your monitor on one of our professional swivel bases (see monitors drawing on the left), you gain the freedom to adjust the monitor viewing angle to suit your needs and thus alleviate eye strain and reduce back stress. The front mounted adjustable control dial makes adjusting the monitor viewing angle very simple.

for 12" Monitors **£7** (carr. £2.50)
for 14" Monitors **£10** (carr. £2.50)

Anti-Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users. Hundreds of these screens are in daily use in various branches of one of the leading High Street banks.

£12

TAXAN KP-815 PRINTER

80 column, Bi-directional, 160 CPS, (NLQ 24cps); Friction & tractor feed + paper roll holder as standard; Epson FX compatible.

Offer Price £155

Taxan KP915 132 Column Printerr (carr £7)	**£275**
RS232 Interface	**£49**
RS232 Interface with 2K Buffer	**£69**
RS232 Interface with 16K Buffer	**£89**

Panasonic KX-P1081

Attractively finished in BBC beige. Bi-directional, logic seeking. Has IBM and Epson RX compatible command calls. Speed: 120CPS draft mode, 24 CPS NLQ mode. Character width range from 5 cpi to 17 cpi. Upto 40 downloadable characters. Functions include, Proportional spacing, Justification, centering and left & right ranging.

(Price inludes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: **£145** (carr. £6)
Optional RS232 Interface: **£39**

Panasonic KX-P3131 Daisy-Wheel Printer

Low-cost, high performance; Bi-directional, Logic seeking, Proportional spacing, 10, 12 & 15 CPI, Speed 17CPS. 6K Buffer.

Only **£255** (carr. £7)

Tractor Feed	**£90**
Daisy Wheel (various)	**£12**
Ribbons: Standard **£4.50**; Long Life **£7**	
Extra 32K Printer Buffer (internally fitted)	**£10**

Centronics LASER Printer

The first Sub £1000 Laser printer. Please write in for price and technical information. **£999**

NEC P2200 PINWRITER

24 pin; 80 column; 168CPS – 56CPS LQ; Epson LQ compatible, 7K Buffer; 7 resident FONTS, Friction & Tractor feed, front load single sheet feed, etc.

Price: £269
FREE Price includes a Free BBC Cable.

Cut Sheet Feeder	**£65**
Additional Font Cartridge	**£25**
NEC P2200 Pinwriter Ribbon	**£6**

NEW

NEC PINWRITER P6/P7 Plus

The Ultimate matrix Printer for Business.

Some of the features are:

- Print Speed, 265cps in Draft and 90cps in letter quality.
- Inbuilt Tractor & Friction feed.
- A paper park & low tear of facility.
- 20 inbuilt FONTS as standard.
- A Font cartridge facility.
- 80K byte Printer Buffer as standard.

Added to all this is a 24 Pin printhead for high quality output, their Centronics parallel interface for easy connection to your computer. Both Pinwriters are software compatible with previous NEC 24 pin Printers, Epson LQ800/1000 & IBM XL24. Colour option is available (optional extra). All this at our launch offer prices of:

P6 Plus 80 columns	**£415**
P7 Plus 136 columns	**£490**
Cut Sheet Feeder	**£125**
Colour Option	**£74**
Serial Interface	**£73**

(For further details, write in for our technical leaflet).

EPSON PRINTERS

EX800	**£415**	LQ850	**£469**
EX1000	**£569**	LQ1050	**£599**
FX800	**£315**	LQ2500+	**£825**
FX1000	**£425**	LQ2550	**£899**
GQ3500 Laser	**£1249**	LX800	**£199**
LQ500	**£285**	SQ2500	**£975**
Star LC10	**£175**	**LC10 Colour**	**£219**

PLOTTERS

Hitachi 672 Colour Plotter	**£475**
Plotmate Plotter A4S	**£379**
Plotmate Plotter A3M	**£549**

CUT SHEET FEEDERS for

EX800 **£130**; EX1000/LQ2550 **£195**; FX800 **£135**; FX1000 **£169**; LQ/LX800 **£125**; LQ500 **£75**; LQ850 **£135**; LQ1050 **£175.**

TRACTOR FEED for

EX800/1000 **£78**; LQ800 **£44**; LQ850 **£69**; LQ1050 **£75**; LQ2500 **£195**

ACCESSORIES

EX800/1000 Colour Option	**£55**
EX800/1000 Colour Ribbon	**£18**
LQ2500 Colour Option	**£65**
Epson Paper Roll Holder	**£19**

(Securicor Carriage on Printers £7

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

RS232	**£27**	RS232 + 2K Buffer	**£52**
IEEE 488	**£65**	RS232 + 8K Buffer	**£62**

Universal Printer Sharers/Changers

Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spagetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments.)

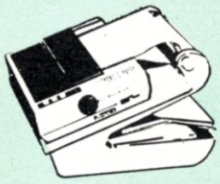
Connects	Serial	Centronics
2 to 1	£22	£23
3 to 1	£30	£32
5 to 1	£40	£42

(Cables extra at £6 each. Please specify type required when ordering)

INTEGREX COLOUR JET PRINTER

- Colour Jet 132 Printer **£515**
- Paper Roll **£6**
- Screen Dump Software **£10**
- Colour Cartridge **£14**
- Black Cartridge **£8**
- 100 A4 OHP transparencies **£55**
- 8K Serial Interface Optional **£99**

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

80 Column version £23 (carr. £2.50)
132 Column version £26 (carr. £2.50)

PRINTER LEADS

BBC Centronics 4' long	**£5**
BBC Centronics 6' extra long	**£7**
Compact's Special Centronics Lead	**£7**
Archimedes Printer Lead 1 meter	**£7**
IBM Parallel Lead 1 meter	**£7**
Double Ended 36 way Centronic Lead	**£9**
RS232 Leads (Various)	**P.O.A.**

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	–	**£3.50**
BBC Master	–	**£4.00**
Archimedes Micro pair	–	**£9.00**
IBM PCs pair	–	**£9.95**
Brother HR15/20	**£3.00**	**£5.00**
DMP2000	**£4.00**	**£4.75**
EX/LQ800	**£5.00**	**£4.50**
EX/LQ1000	**£8.00**	**£5.00**
RX/FX80/85/800/MX80	**£4.00**	**£4.95**
RX/FX100/1000	**£6.00**	–
Kaga/Taxan KP810/815	**£5.25**	**£4.00**
LC10 (Black)	**£4.50**	**£5.00**
LQ500/800	**£4.00**	**£5.00**
LQ1050/LQ2500	**£9.00**	**£5.50**
LX80/86/800	**£4.00**	**£4.50**
M1009/GLP	**£4.00**	**£3.75**
Panasonic KX1080/81	**£4.50**	**£4.75**
SQ2500	**£25.00**	**£5.50**
Star NL10	**£4.00**	**£4.50**
Olivetti Ink Jet Cartridges (set of 4)	**£10**	

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Listing Paper (Perforated)

- *1,000 Sheets 9½" × 11" Fanfold Paper* **£7**
- *2,000 Sheets 9½" × 11" Fanfold Paper* **£12**
- *1000 Sheets 9½" x 11" NCR 2 Part Fanfold* **£19**
- *1,000 Sheets 15" × 11" Fanfold Paper* **£9**
- *1000 Sheets true A4 Fanfold Paper* **£11**
- *2000 Sheets true A4 Fanfold Paper* **£19**
- *Teleprinter Roll (Econo paper)* **£4**

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

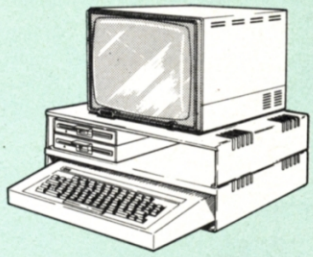
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 × 36mm (Single Row)	***£5.00***
1,000 90 × 36mm (Twin Row)	***£4.90***
1,000 90 × 49mm (Twin Row)	***£7.50***
1,000 102 × 36mm (Twin Row)	***£6.25***

Carriage on 1,000 Labels £1.00

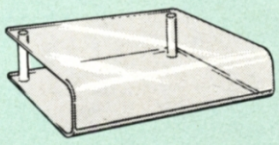
PLINTHS FOR BBC MICRO, MASTER & PRINTERS



Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid. The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows access to paper from all sides.

Single BBC Plinth	**£12** (carr. £2)
Double BBc Plinth	**£20** (carr. £3)
Printer Plinth	**£12** (carr. £2)
Single Master Plinth	**£13** (carr £2)
Double Master Plinth	**£24** (carr £3)

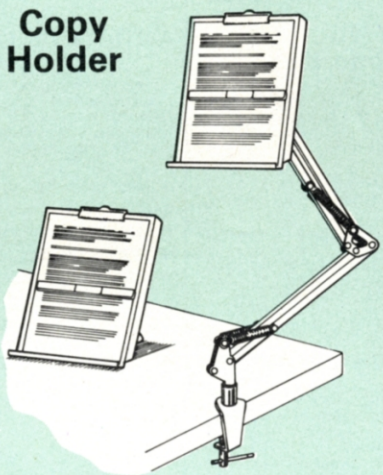
Perspex Printer Stand



Give your Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand. The printer sits on top and the fanfold paper rests neatly underneath, thus occupying the same space as the printer footprint.

Only: £16 (carr. £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding your paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£10** (carr. £2)
Angle poise **£14** (carr. £3)

MEGABUFFER 256

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

***Only £179** (carr £2)*

OKIMATE COLOUR PRINTER

The first ribbon transfer printer in its price range which offers fully versatile colour or black printing. A 24 element print head produces more than 100 shades with exceptional clarity. Ideal for use with Quest Paint or AMX Super Art.

Only: **£119**

BBC Screen Dump	**£10**
Colour Ribbon	**£6**
Black Ribbon	**£6**

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

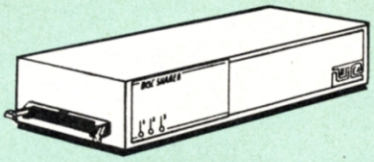
£5.95 (No VAT)

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

Continued ——→

NEW

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£65** Price includes 3 Cables

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for six years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. ***(P.S. Watford's highly sophisticated DFS is fully compatible with Acorn standard DFS). (while Acorn's 1770 DFS is fully compatible with Watford's Mk II DDFS)***

- *Complete Disc Interface Kit including DFS ROM and fitting instructions* **£48**
- *Acorn's 0.90 DFS Kit complete* **£49**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**

(P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).

- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£17**
- *ADFS ROM only* **£25**

NEW

Watford's MkII 1770 Double Density DFS Interface

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features:

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00**.

- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

DUST COVERS (For our Disc Drives)

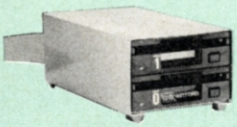
Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

Special 40/80 Disc Drive/DDFS Mk II Offer

- The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both, Single & Double Density modes.
- A comprehensive User Friendly Manual.

A Bargain at Only **£125** (£6 carr)
(Offer valid while stocks last)

3½" DISC DRIVE OFFER



These top quality 3½" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

- **CLS35 400K Unit** **£69**
- **CLD35 800K Unit** **£126**

Mysteries of Disc Drives & DFS Revealed

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in black leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3½" & 5¼", please specify.

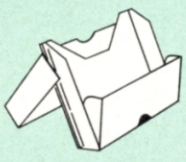
£6

ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- **M35** - holds upto 50 5¼" discs **£6.00**
- **M85** – holds upto 95 5¼" discs **£8.00**
- **M25*** – holds upto 25 3 ½" Discs **£5.50**
- **M50** – holds 50 3½" Discs **£7.50**
- **M10** – holds upto 10 Data Cartridges **£15**

* Not lockable



PLASTIC LIBRARY CASES

Holds up to 10 5¼" Discs. **Only £2.00**

DISC PLONKER RACK

When using ones micro, there is a tendancy to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5¼" Discs.

Protection at Only: **£2**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

***All our Disc Drives are Double Sided and will operate in both Single and Double Density modes.** Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*

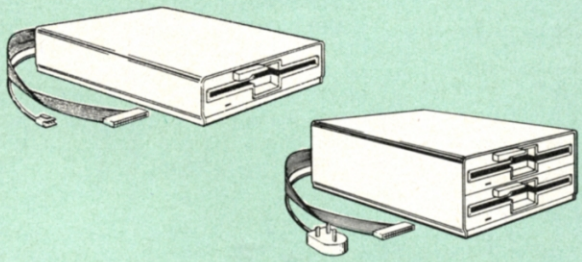
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today)!

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinth. (Turn to the 5th page of our advert for the Plinths).
P.S. All our 5¼" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £89		CS 200 £98	
400K (720K)	CLS400S £82	CLD 400 £168	CS 400S £92	CD400 £188
800K (1.44M)		CLD 800S £162		CD 800S £182

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £5 to £6

Prefix ***C*** *= Cased Drive*
L *= Less PSU*
S *= Single*
D *= Double*

Suffix ***S*** *= 40-80 Switchable*

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5¼" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5¼" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3½" and 5¼" Disc Drives simultaneously to the BBC Compact £13

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

- *10 × 5¼" S/S D/D 40 Track Diskettes (744)* ***£6.00***
- *10 × 5¼" D/S D/D 40 Track Diskettes (745)* ***£7.50***
- *10 × 5¼" S/S D/D 80 Track Diskettes (746)* ***£11.50***
- *10 × 5¼" D/S D/D 80 Track Diskettes (747)* ***£11.75***
- *10 × 5¼" 1.6M D/S D/D High Density Discs for IBM XT and AT* ***£19***
- *10 × 3½" S/S D/D 40/80 track Discs* ***£10.00***
- *10 × 3½" D/S D/D 40/80 track Discs* ***£11.75***
- *10 × 3½" High Density Diskettes* ***£37***

TOP QUALITY 3½" & 5¼" DISKETTES

To complement our range of Quality Discs and Disc Drives, WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

- *10 × **M3** 3½" D/S D/D 80 Track Discs* ***£11***
- *10 × **M9** 3½" D/S D/D 80 Track Discs* ***£34***
- *10 × **M4** 5¼" S/S D/D 40 Track Discs* ***£5***
- *10 × **M5** 5¼" D/S D/D 40 Track Discs* ***£7***
- *10 × **M7** 5¼" D/S D/D 80 Track Discs* ***£9***
- **10 × M8 5¼" D/S H/D Hi-Density Discs** **£14**
- *3" Double Sided Discs* ***£3*** *each*

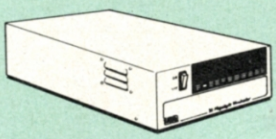
PRICES SLASHED

Special BULK OFFER on 5¼" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

BULK PACK DISCS in lots of 100

Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48



WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a full user guide and full utilities including file copy, 1000K save routines, Format and Verify – in fact all you need and more.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBc B (with 17 X disc interface).

● 10 Megabyte **£350;** ● 30 Megabyte **£420**

CDP800S **CDPM800S**

Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £192
CDPM 800S for Master £196
DP35-800 for BBC/Master £165
(For DP35-800S spec. see Page 9 of our advert)

(Securicor Carr. £7)
(The above drive units are 2 Megabytes unformatted)

Continued

NOMINATED FOR BRITISH MICRO COMPUTING AWARDS 1987

QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package

With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87
"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."
"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87
"Quest Mouse and Quest Paint can hold their heads high in the market. . ."

A&B Computing June '87
". . . Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package..."

". . . you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias – a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro . . ."
"Quest Paint is a major leap forward in BBC programming. . ."
"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages".

Acorn User, September '87
"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest . . ."
". . . this package represents excellent value for money. If you are interested in art then this program is for you to buy".
"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date".
"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require".
"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function".
"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford".
"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus . . ."
"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides".
"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program".
The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package".

John Kilby, Head of Computer Science, Bishop Wulstan High School, Rugby, writes:
"Quest has been an excellent piece of equipment. The problem that seems to occur everyday is that at lunchtime the pupils rush to the computer room to make sure that they are first in the queue for the 'Quest' mouse".

Lt. Col. C.G. Holton, HQ 1 (BR) Corps, BFPO 39, writes:
"As ever your service is superb and the Quest Mouse proves every bit as good as the adverts claim".

Beeblet User Group, New Zealand Oct '87:
"One of its nicer features is that the top menu is done in Mode 0, the drawing itself is in Mode 1. Thus on screen together are two different Modes. A neat way around an old problem".

"PAN is used when a larger than one screen size image is required. The mind boggles at an A3 size drawing".

"I like it partly because of the mouse itself which is smooth and easy to handle but mainly I suppose because of the features I longed for and previously never got. Its easy to use with almost everything at your fingertips from the mouse. The software is simple where needed and complex where complexity is required".

ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.
Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

QUEST MOUSE & QUEST PAINT	**£54**
QUEST MOUSE, QUEST PAINT, AMX PAGEMAKER & PAGEFONT	**£82**
QUEST MOUSE ONLY	**£25**
QUEST PAINT SOFTWARE	**£32**
QUEST FONT DISC	**£12**
ConQuest 32K ROM Package	**£29**
QUEST MAT	**£3**
Part-exchange your old Mouse for a New QUEST MOUSE for only	**£23**
GXR ROM for BBC Micro	**£22**

N.B.
1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

MARK II LIGHT PEN

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Price Only £21
(Price includes FREE software Disc and Operating Manual)

RB2 Marconi Tracker Ball

RB2 (AMX/Quest compatible)	£52
RB2 including Quest Paint	£78

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Software Pack for Compact	£40
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

THE NEW Mk III AMX MOUSE

ONLY: £59 Inc. Super Art package
(carr £1.50)
(Please specify for BBC, Master or Compact)

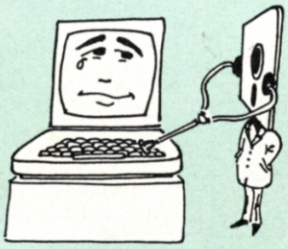
FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX UTILITY Package	£11
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publising software. Works with Keyboard, Joystick or a mouse	£32

We are giving away absolutely FREE, our PAGE-FONT disc with every purchase of STOP PRESS from us.

PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£12
AMX DESIGN (ROM)	£55
AMX 3D ZICON Disc	£19
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£15

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.
The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:
RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.
This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package i designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £3)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)
A combination of the Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Pagemaker to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)

OFFICE MASTER

CASHBOOK – A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS – Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST – A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDGER – A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS – Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL – Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21** (Disc)

OFFICE MATE

- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

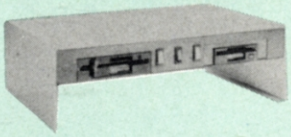
DATABASE – Set up a computerised card index system with powerful search facilities.

SPREADSHEET – Offers many calculation and editing features.

BEEBPLOT – Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

Disc Drives DP35-800S



A Double disc drive – with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S, it contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. For ease of access, the switches are front mounted. DP35-800S has its own power supply, independent of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format – currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: **£165** (carr. £7)

Continued ➔

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro – no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

- Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price: Aries B-12 **£40**
Aries B-12C **£5**

ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

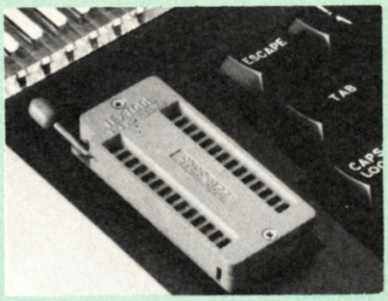
£238 (Carr £3)

EXTERNAL ROM BOARD for BBC MASTER

This external Beige finished, free standing cased unit with its own Power Supply allows you to plug-in upto 12 ROMs and 16K Sideways RAM.

Only £78

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.
- The low profile of the socket allows unrestricted access to the Keyboard.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)
- BBC, B+ and Master compatible.

ONLY **£16** (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

- Complete System **£11**
- Spare Cartridges **£2.50**
- Spare Rack **£1.50**

ROM Cartridges for the BBC Master
Twin **£8**; Quad **£12**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

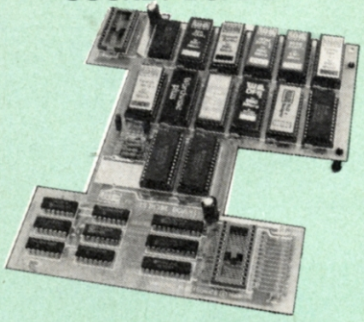
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: **£29** (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others – not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

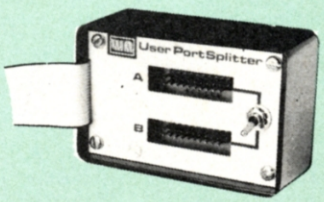
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
Battery Backup only **£3**
(carriage £2)

- Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

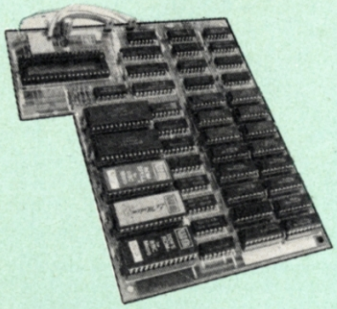
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaniously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at **£22** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM ***£45***
- ROM/RAM card with 64k dynamic RAM ***£59***
- ROM/RAM card with a massive 128k dynamic RAM **£89**

(carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit **£16**
- 16k Dynamic RAM for Upgrade **£16**
- Battery backup **£3**
- Read and Write protect switches ..... **£2** each

Complete ROM-RAM board
All options installed **£115**

P.S.
Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.*
- *Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple '*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- ***FREE Registration to MicroLink.***

SPECIAL OFFER

Price: ***£82***
(carr £3)

(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£15 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

APOLLO

The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- **FREE Registration to MicroLink.**

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution – Buy a Watford APOLLO!

Only: **£82** **(Carr £3)**

Price includes, the Modem, Comm Software Cables & Operating Manual).
(Write in for full specification)

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£15
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£11
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7

ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.

Only **£10** (£2 carr.)

Versatile BEEB SPEECH SYNTHESISER Unit

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £2)

Continued

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£46
CARETAKER Basic Utility	£23
DISC DOCTOR	£28
Graphics ROM	£29
TERMI	£25
COMMUNICATOR	£49
SPEECH SYSTEM	£35
Printmaster	£25

Wordwise £23

Wordwise plus £40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £42

Inter SHEET ONLY £37

INTER-CHART ONLY: £25

Inter-WORD £36

MEGA-3 ROM

Interword, Intersheet & Interchart – 3 in one ROM £76

INTERBASE £49

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1	£35
VIEW 3.0 ROM	£48
VIEW PROFESSIONAL	£65
HI-VIEW (for 6502 2nd Processor)	£36
VIEWSHEET (Acornsoft)	£36
VIEWSTORE	£36
VIEWSPELL with 80 track disc	£29
VIEWPLOT Disc (Please specify for Master 128 or Compact)	£20

VISA

CREDIT CARD 24 HOUR Ansaphone Hot Lines (0923) 50234 or 33383

VIEW-INDEX	£12
OVERVIEW Packs 1 & 2	£69

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc)	£8
Juki & Brother HR15 (Disc)	£8
Silver Reed Printers (Disc)	£8

MINI OFFICE II

DISC Version for BBC B & B+	£14.00
DISC Version for BBC Master	£16.50
ROM Version	£43.00

(When ordering please specify for which Micro & 40 or 80 track Disc).

EPSON NLQ ROM

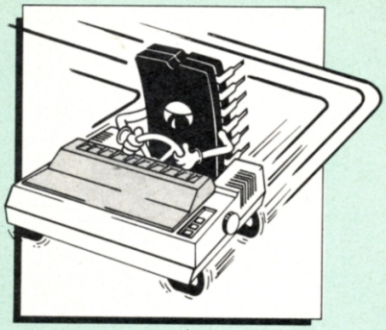
Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM £7

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

ROM-SPELL

Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

DUMPOUT 3

A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including full Mode 7 graphics.
Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

The Micro User Feb. 1985.
'Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro . . . it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:

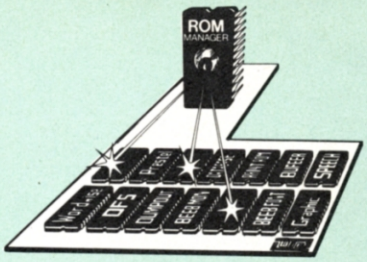
GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Mannesman Tally and compatibles.

Only: £25

BBC SOFTWARE'S
Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs **£11.25**
- Maths with a Story 2 (Disc) 4 further maths programs **£11.25**
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs **£17**
- WAVES: Science Topics (Disc) CSC O Level Physics program. **£14.95**
- RELATIONSHIP: Science (Disc) O Level Biology program. **£20.00**
- BONDING: Science (Disc) O Level Chemistry program. **£20.00**
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. **£20.00**
- ELECTRONICS IN ACTION (Disc) O Level program **£19.95**
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. **£20**
- ECOLOGY (Disc) O Level program. **£20**
- POLYMERS (Disc) O Level program. **£20**
- Clasification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule. **£20**
- FOOD & POPULATION (Disc) O Level program. **£20**
- MICROTECHNOLOGY (Cassette) O Level program. **£11.25**
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. **£21.70**
- DEUTSCH DIREKT! (Disc & Audio Cassette) **£19.95**
- Modem Master (Disc) **£11.25**
- ADVANCED TELETEXT SYSTEM **£8.65**
- PERIOD TABLE SOFTWARE **£20**
- Astronomy – Primary (Disc) **£12**
- Computers at Work – Primary **£17.35**
- Introducing Geography – Primary **£17**
- **Introducing Geography 11-17yrs** **£17.50**
- Electric Fields 6-14 years **£11.25**
- BlackQueen Contract Bridge **£13**
- Espana Viva – 3 Discs **£19.95**
- A Vous La France Disc **£21.50**

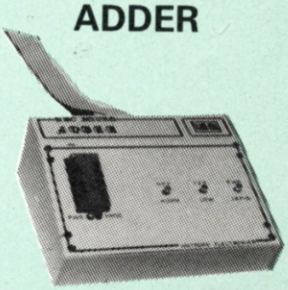
ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.
"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.
Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.
The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.
The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.
Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

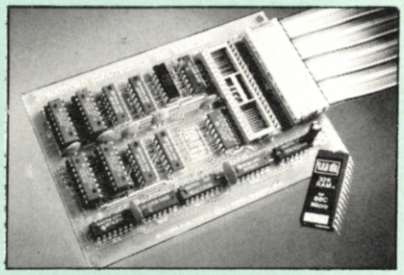
£75 (£3 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28** (carr £2)
- **ERASER GT** – Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30** (carr £2)
- Spare UV tubes. **£9**

32K
SHADOW RAM-
Printer Buffer
Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.
- "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.
- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.
- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.
- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.
- Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.
- Recommended by Computer Concepts for use with their Inter series of ROMs.

Only £59 (carr £2)
(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (carr £2)

Continued ——→

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£5.95
15 Hr Wordprocessing BBC/WW & WW+	£5.95
30 Hour BASIC (BBC Micro)	£9.95
6502 Assembly Language Program	£19.95
6502 Application	£13.95
6502 Development Package	£7.50
6502 Programming the	£16.95
6502 Reference Guide	£10.95
68000 Assembly Language	£15.95
68000 Assembly Language Prog.	£19.95
68000 Assembly Language Techniques	£24.95
68000 Machine Code Programming	£13.00
68000 Microprocessor Handbook	£14.95
68000 Programming the	£22.95
68000 User Guide	£8.95
6809, Programming the	£18.95
8086/8088 Assembly Language Prog.	£11.95
8086/8088 Programming the	£17.95
Advanced Disc User Guide	£16.95
Advanced Prog. Guide to BBC	£9.95
Adv. Sideways RAM User Guide	£9.95
Advanced User Guide for BBC	£10.95
Amiga Hardware Ref Manual	£23.70
Amiga Machine Lang. Guide	£19.95
ARM Assem, Lang, Programming	£12.95
Art of Microcomputer Graphics	£15.95
Assembly Language Prog. for the BBC	£9.95
AY-3-8910 Programmable Sound Generator Data Manual	£3
BASIC 2 – User Guide	£2
Basic ROM User Guide	£11.95
BBC – Advanced Graphics with the	£10.95
BBC – Advanced Programming Techniques for	£8.95
BBC – Mastering Assembly Code	£8.95
BBC Micro & the small Business	£5.75
BBC Micro Basic Sound & Graphics	£7.95
BBC Micro – File Handling On	£7.95
BBC Micro Programs in BASIC	£5.95
BBC Micro ROM Book	£10.95
BBC Master 128 for High Flyer	£10.95
BCPL User Guide	£14
BCPL The Language & its Compiler	£7.95
C Big Red Book of	£7.50
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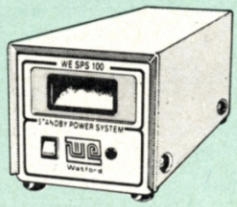

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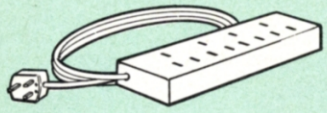

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GRAPHICS PACKAGE

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Tight for space

Paul Dellar squeezes the last drop out of a graphics screen

THERE can't be many new Archimedes owners who have not spent hours exploring the graphics of their machine and filling up 3.5in discs with screen dumps. The trouble with using the *SCREENSAVE command is that screens – like any large file – take a long time to load and save even with the fast 800k format, and disc space is used up rapidly.

The two programs given here are fast ARM code utilities to load and save screens with their colour palettes and mode data in a compressed format. The two new commands – *ScrnLoad and *ScrnSave – are similar to the operating system's except that they always act on the whole screen rather than the current graphics window.

The table below shows typical file sizes and times for saved screens. All tests were conducted using the 800k disc format with the utilities in the library directory. All the pictures were professionally produced and as you can see, very considerable reductions in both size and loading time can be achieved.

Compression is achieved by considering the screen to be made up of a very long horizontal line which begins in the top left hand corner of the screen and works from left to right going off the right hand edge to reappear one pixel lower down on the left hand edge.

The line can be broken down into a number of individual segments – each up to 255 bytes long – with colour and length recorded as two bytes in the screen file. Of course if the colour changes on every successive byte this algorithm will fail – the final file will be bigger than the original – but this situation is unusual. Even the more complex sample pictures are still smaller than the originals.

The loader program simply takes the colour and length data and reconstructs the screen by redrawing the horizontal lines. This is exactly how VIDC – the Archimedes's video controller – maps the screen in ram, as horizontal lines of consecutive bytes rather than using the cumbersome columns of eight bytes as in the older BBC Micros, This feature makes the compression code very easy to write but means that old screens and sprites designed on earlier BBC Micros cannot be used directly on the Archimedes.

Both the load and save utilities have been written in ARM assembler and should be fairly easy to follow. The machine code programs themselves are saved as transient utilities – relocatable ARM code programs which are loaded off disc by the operating system into the Relocatable Module Area (RMA) before being executed.

In addition, the operating system gives the transient routine 1,024 bytes of workspace in the RMA immediately after the utility itself. This sort of program is best saved in your library directory where it can be reached from anywhere on your disc.

If you want to use the new routines all the time you can initialise two Alias$ instructions to intercept the standard Arthur commands:

```
*set Alias$SCREENSAVE ScrnSave %0
*set Alias$SCREENLOAD ScrnLoad %0
```

One unusual error message that may be produced is *No room in RMA for transient* which means that all relocatable module space has been used up. In this case you'll just have to re-configure the machine for more and start again.

So type in the listings, ensure they're correct with the Archimedes checksum program on the monthly disc, and get more pictures on to your discs.

File	Normal			Compressed			Changes		
	Size (bytes)	Load (secs)	Save (secs)	Size (bytes)	Load (secs)	Save (secs)	Size (%)	Load (%)	Save (%)
1	140B8	18.5	25.8	A25F	10.3	11.3	50.6	55.7	43.8
2	140B8	18.5	25.8	26E5	3.2	3.6	12.1	17.3	14.0
3	140B8	18.5	25.8	2C73	3.4	4.1	13.9	18.4	15.9
4	140B8	18.5	25.8	120FD	18.0	18.9	90.1	96.8	73.3
5	140B8	18.5	25.8	11DC9	17.8	18.4	89.1	96.2	71.3
6	140B8	18.5	25.8	2E61	3.5	4.3	14.5	18.9	16.7
7	140B8	18.5	25.8	10C53	16.8	17.5	83.7	90.8	67.8
8	140B8	18.5	25.8	1E37	2.6	3.0	9.4	14.1	12.4
9	140B8	18.5	25.8	1D07	2.6	3.4	9.1	14.1	13.2

Normal to compressed Mode 12 screens

Listing I: The loader

```
 10 REM >$.LoadSrc
 20 REM by Paul J.Dellar
 30 REM (c) The Micro User
 40 PROCassemble
 50 OSCLI("SAVE ScrnLoad "+STR$~code%+" "+STR$~O%)
 60 *SETTYPE ScrnLoad &FFC
 70 END
 80 DEF PROCassemble
 90 DIM code% &1000
100 link=14
110 FOR pass%=4 TO 6 STEP 2
```

Turn to Page 108 ▶

◀ *From Page 107*

```
120 P%=0:O%=code%
130 [OPT pass%
140  MOV    r6,link       \ store caller's return addr
150 \ retrieve filename and open file for input
160  MOV    r0,#&4C       \ openin with errors flagged
170  SWI    "XOS_Find"    \ open file by r1 (command tail)
180  BVS    exit          \ exit if an error occurs
190  MOV    r5,r0         \ store file handle for later
200 \ find the current screen mode
210  MOV    r0,#&87       \ OS_Byte &87
220  SWI    "XOS_Byte"    \ read the screen mode into R2
230 \ change  the screen mode if necessary
240  MOV    r1,r5
250  BL     read_byte     \ get the required mode
260  CMP    r0,r2         \ is it the current mode ?
270  SWINE  &100+22       \ otherwise change mode
280  SWINE  "OS_WriteC"
290 \ find the screen's start & end addresses
300  ADR    r0,vdu_block \ addr of vdu vars data block
310  ADD    r1,r0,#12     \ addr to return parameters
320  SWI    "OS_ReadVduVariables"
330  LDR    r2,[r1]       \ return screen base addr
340  LDR    r3,[r1,#4]    \ and length
350  ADD    r3,r3,r2      \ find the end addr
360  SUB    r2,r2,#1      \ correct the start addr
370 \ reprogram the palette from save data
380  MOV    r4,#0         \ initialise loop counter
390  ADR    r7,os_block   \ pointer to data block
400 .col_loop
410  MOV    r1,r5         \ initialise file handle
420  STRB   r4,[r7,#0]    \ set colour to define
430  MOV    r0,#17        \ first flashing part
440  STRB   r0,[r7,#1]
450  BL     read_byte
460  STRB   r0,[r7,#2]    \ define red component
470  BL     read_byte
480  STRB   r0,[r7,#3]    \ define green component
490  BL     read_byte
500  STRB   r0,[r7,#4]    \ define blue component
510  MOV    r0,#&0C       \ r0 = OS_Word type
520  MOV    r1,r7         \ r1 = pointer to data
530  SWI    "OS_Word"
540  MOV    r1,r5         \ initialise file handle
550  MOV    r0,#18        \ second flashing part
560  STRB   r0,[r7,#1]
570  BL     read_byte
580  STRB   r0,[r7,#2]    \ define red component
590  BL     read_byte
600  STRB   r0,[r7,#3]    \ define green component
610  BL     read_byte
620  STRB   r0,[r7,#4]    \ define blue component
630  MOV    r0,#&0C       \ r0 = OS_Word type
640  MOV    r1,r7         \ r1 = pointer to data
650  SWI    "OS_Word"     \ OS_Word &0C
660  ADD    r4,r4,#1      \ count through all 16 palette
670  CMP    r4,#16        \ registers
680  BLT    col_loop
690  MOV    r0,#0
700 .wait_loop            \ wait for palette to settle down
710  ADD    r0,r0,#1
```


THE MICRO USER MAIL ORDER OFFERS

THE MICRO USER MAIL ORDER OFFERS

Get THE MICRO USER FREE each month

SAVE UP TO £31!

when you subscribe to our monthly tape or disc

Incredible, but true, for a limited period we are now giving away *The Micro User* for a whole year – when you take out a tape or disc subscription. That's worth £18! And you will be eligible to save up to a further £13 on the special subscription offers on Page 135.

Each of the monthly tapes and discs is packed with all the fun-filled games and power-packed utilities from the pages of *The Micro User,* plus occasional extras, such as weather maps and Archimedes programs, which you won't find in the magazine.

Remember, this offer is for a limited period only, so save the wear and tear on your fingers, and ensure you get programs that work the first time, by taking us up on this special offer, *today!*

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```
720  CMP    r0,#&40000   \ time delay (adjust to suit)
730  BLT    wait_loop
740 \ the expansion algorithm
750  MOV    r1,r5
760 .main_loop           \ base,top,handle already init'ed
770  BL     read_byte
780  MOV    r4,r0        \ get the line's colour
790  BL     read_byte    \ & its length
800 .loop2
810  SUB    r0,r0,#1
820  STRB   r4,[r2,#1]!  \ poke it into video ram
830  CMP    r0,#0
840  BGT    loop2
850  CMP    r2,r3
860  BLT    main_loop    \ until the end of video ram
870 \ close file and exit
880  MOV    r0,#0
890  SWI    "XOS_Find"   \ close the file
900 .exit
910  MOV    pc,r6        \ exit to caller
920 .read_byte           \ read byte, flag error if EOF
930  SWI    "XOS_BGet"
940  MOVVC  pc,link      \ return if no error
950 \ close file,flag error and return
960 .error
970  MOV    r2,r0        \ store error pointer
980  MOV    r1,r5        \ get file handle
990  MOV    r0,#0
1000 SWI    "XOS_Find"   \ close file
1010 MOV    r0,r2        \ retrieve error pointer
1020 ORR    pc,r6,#1<<28 \ set V flag and return
1030 .vdu_block          \ data block for OS_ReadVduVariables
1040 EQUD   149          \ get start addr
1050 EQUD   7            \ get length
1060 EQUD   -1           \ end of block marker
1070 EQUD   0
1080 EQUD   0            \ space to return data
1090 .os_block           \ block for OS_Word &0C
1100 EQUD   0:EQUB   0
1110 ]:NEXT:ENDPROC
```

Listing II: The save utility

```
 10 REM >$.SaveSrc
 20 REM by P.J.Dellar
 30 REM (c) The Micro User
 40 PROCassemble
 50 OSCLI("SAVE ScrnSave "+STR$~code%+" "+STR$~O%)
 60 *SETTYPE ScrnSave &FFC
 70 END
 80 DEF PROCassemble
 90 DIM code% &1000
100 link=14 : REM return addr for subroutines
110 FOR pass%=4 TO 6 STEP 2
120 P%=0:O%=code%
130 [OPT pass%
140  MOV    r7,link
150 \ header to retrieve filename and open file
160  MOV    r0,#&8C     \ openout with errors flagged
170  SWI    "XOS_Find" \ open file by r1 (command tail)
180  BVS    exit        \ exit if an error occurs
190  MOV    r6,r0       \ store file handle for later
200 \ find the screen mode and palette and save them
210  MOV    r0,#&87
220  SWI    "XOS_Byte" \ read the screen mode
230  MOV    r0,r2
240  MOV    r1,r6       \ get the file handle
250  BL     put_byte
260  MOV    r5,#0       \ setup the palette loop
270 .col_loop
280  MOV    r0,r5
290  MOV    r1,#16
300  SWI    "OS_ReadPalette"  \ read the palette data
310  MOV    r1,r6
320  MOV    r0,r2,LSR #8  \ red component of first part
330  BL     put_byte
340  MOV    r0,r2,LSR #16 \ green component of first part
350  BL     put_byte
360  MOV    r0,r2,LSR #24 \ blue component of first part
370  BL     put_byte
380  MOV    r0,r3,LSR #8  \ red component of second part
390  BL     put_byte
400  MOV    r0,r3,LSR #16 \ green component of second part
410  BL     put_byte
420  MOV    r0,r3,LSR #24 \ blue component of second part
430  BL     put_byte
440  ADD    r5,r5,#1
450  CMP    r5,#16
460  BLT    col_loop     \ loop back for all 16 colours
470  ADR    r0,vdu_block \ addr of vdu vars data block
480  ADD    r1,r0,#12    \ addr to return parameters
490  SWI    "OS_ReadVduVariables"
500  LDR    r2,[r1]      \ return screen base addr
510  LDR    r3,[r1,#4]   \ and length
520  ADD    r3,r3,r2     \ find the end addr
530  SWI    "XOS_RemoveCursors"
540  MOV    r1,r6
550 \ the compression algorithm
560 .main_loop
570  LDRB   r0,[r2]      \ get the line's colour
580  BL     put_byte     \ & store it
590  MOV    r4,#1
600 .loop2
610  LDRB   r5,[r2,#1]!  \ keep moving forwards
620  ADD    r4,r4,#1
630  CMP    r5,r0
640  BNE    skip         \ until it ends
650  CMP    r4,#&FF
660  BLT    loop2        \ or grows too long
670 .skip
680  SUB    r0,r4,#1     \ store its length
690  BL     put_byte
700  CMP    r2,r3
710  BLT    main_loop    \ repeat for whole screen
720 \ close file
730  MOV    r0,#0
740  SWI    "XOS_Find"   \ close the file
750  SWI    "XOS_RestoreCursors"
760 .exit
770  MOV    pc,r7   \ exit to caller
780 .put_byte        \ read byte, flag error if EOF
790  SWI    "XOS_BPut"
800  MOVVC  pc,link \ exit if no error
810 \ close file,flag error and return
820 .error
830  MOV    r2,r0   \ store error pointer
840  MOV    r1,r6   \ get file handle
850  MOV    r0,#0
860  SWI    "XOS_Find"   \ close file
870  SWI    "XOS_RestoreCursors"
880  MOV    r0,r2        \ retrieve error pointer
890  ORR    pc,r7,#1<<28 \ set V flag and return
900 .vdu_block
910  EQUD 149      \ get base addr
920  EQUD 7        \ get length
930  EQUD -1       \ end of block marker
940  EQUD 0
950  EQUD 0        \ space to return data
960 ]:NEXT:ENDPROC
```

This listing is included in this month's tape & disc offer. See order form on Page 135.

◀ *From Page 84*

```
  490 COLOUR 3:PRINT""Start address of
machine code = ";
  500 COLOUR 1:PRINT "&";~code
  510 ENDPROC
  520 :
  530 DEF PROCassemble
  540 filev=&212
  550 osgbpb=&FFD1
  560 oscli=&FFF7
  570 FOR pass=0 TO 2 STEP 2
  580 P%=code
  590 [OPT pass
  600 .init
  610 :
  620 \ Store address contained in vecto
r
  630 LDA filev:STA oldvec:STA save1+1:S
TA save2+1
  640 LDA filev+1:STA oldvec+1:STA save1
+2:STA save2+2
  650 :
  660 \ Replace address contained in vec
tor
  670 LDA #start MOD 256:STA filev
  680 LDA #start DIV 256:STA filev+1:]
  690 :
  700 IF break$<>b1$ THEN PROCbreak
  710 :
  720 [OPT pass
  730 RTS
  740 :
  750 .start
  760 :
  770 \ Check for save command
  780 CMP #0:BNE exit
  790 :
  800 \ Store registers
  810 STX zero:STY zero+1:]
  820 :
  830 IF dfs$<>"WATFORD" THEN PROCstore_
block
  840 :
  850 [OPT pass
  860 \ Check if drive specified in file
name
  870 LDX #1:LDY #1
  880 .loop1
  890 LDA (zero),Y
  900 STA zero+2,X
  910 DEX:DEY:BEQ loop1
  920 LDY #0
  930 LDA (zero+2),Y
  940 CMP #&3A:BEQ normal_save
  950 :
  960 \ Store current drive
  970 LDX #osgbpb_block MOD 256
  980 LDY #osgbpb_block DIV 256
  990 LDA #6
 1000 JSR osgbpb
 1010 :
 1020 \ First save
 1030 :
 1040 \ Change drive
 1050 LDX-#command MOD 256
 1060 LDY #command DIV 256
 1070 JSR oscli
 1080 :
 1090 JSR restore_registers
 1100 .save1
 1110 JSR &0000
 1120 :
 1130 \ Second save
 1140 :
 1150 \ Change drive
 1160 LDA drive2
 1170 STA command+3
 1180 LDX #command MOD 256
 1190 LDY #command DIV 256
 1200 JSR oscli:]
 1210 :
 1220 IF dfs$<>"WATFORD" THEN PROCrestor
e_block
 1230 :
 1240 [OPT pass
 1250 JSR restore_registers
 1260 .save2
 1270 JSR &0000
 1280 :
 1290 \ Restore current drive
```

Turn to Page 112 ▶

The truth about TELEX

How much does it cost to go on Telex?

You could go the conventional way and buy a dedicated Telex machine. The cheapest will cost you £1,604 (the Whisper), the dearest £2,892 (the Cheetah). You will also need a separate telephone line, costing £101 to install, plus £404 a year rental. That's a total outlay over the first year of a minimum of £2,109. (All prices include VAT.)

Or you could do what more and more BBC Micro users are doing – use your BBC Micro to double as a Telex machine. And just use your ordinary telephone!

How do I turn my BBC Micro into a Telex machine?

All you need is a modem and appropriate communications software (see the advertisements in this issue), a telephone, and a subscription to *MicroLink*.

Telex is just one of a growing number of services available to micro users on *MicroLink*. You can also read the news as it happens, go teleshopping, create your own closed user group, send telemessages and electronic mail right round the world, download free programs directly into your micro . . . and much more.

But why use Telex?

Because it's a standard means of instant communication between businesses. Today there are 150,000 Telex machines in use in Britain – and more than 2 million worldwide. It's used to dramatically speed up business communications – it's just as quick as using the phone but far more efficient, because you have a hard copy of every "conversation" for your records.

But there's a big bonus you get when you use *MicroLink* for Telex that the conventional way doesn't offer.

With *MicroLink* you don't HAVE to be in your office to send or receive Telex messages. You can just as easily use your computer at home (or even a portable). So now you can check whether there are any Telex messages waiting for you – anywhere, anytime. How's that for your business efficiency?

How to join:
Phone 0625 878888

B B+ M A

Terminal termite

Mike Cook puts a new insect under the microscope

Title: Termite interface unit
Price: £79 (£129 with Spider)
Producer: Paul Fray, Willowcroft, Histon Road, Cambridge CB4 3JD.
Tel: 0223 66529

THE Termite is a well made interface box designed to plug into the user port allowing you to use the BBC Micro to control eight input/outputs in a totally safe way. The signals to and from the machine are all optically isolated, which means no direct connection to your equipment. Thus it has the advantage of complete safety – there is no way that your micro can be damaged, no matter what you do with the signals.

This total isolation has a price – you have to supply power for the isolated part of the circuit although, at a reduced protection level, the micro's own supply can power the Termite.

The unit comes with more than a metre of cable to attach it to the user port as well as a slightly shorter lead to connect it to the auxiliary power socket. If you're using it for something else you can connect to a feed-through socket on the Termite.

The external power feed into the Termite is by screw terminals, can be between 5 and 30 volts DC and is fused. The lid of this 180x110x55mm box contains 16 terminals, one for each of the eight inputs and outputs. Each is monitored by an LED giving a clear indication of what's going on. I would have liked to see some more earth connections as there is only one on the side of the box and that needs to be used if you employ an external power supply.

Inputs are directly connected to the opto-isolators, which means that the devices connected to it must be capable of lighting an LED. They have to source current at about 2 volts into a load of 2K7 to register as an input. This is fine for most TTL inputs, but if you are connecting any Cmos devices as inputs you might run into trouble. The high voltage level for inputs is not restricted to the normal 5 volts, but can be anything up to 30 volts.

The output drive capability is beefy indeed: If an external power supply is used, each output can source up to 2A, although the total current must not exceed 10A. This is provided by Darlington drivers on the outputs, which also drive the monitoring LEDs, but is reduced to a maximum of 1A if the internal supply is used. The Termite may be controlled by any language and the maker even produces its own control language, Spider. There are demonstration programs written in Spider and Basic in the comprehensive 35 page manual plus wiring diagrams for each. Topics covered include micro switches, stepping motors and intruder detectors.

This is an extremely well made unit, with wiring and printed circuit board of the highest quality. It is also extremely robust – an important consideration for classroom use. It is convenient to use especially for those who want high current/low voltage outputs and a totally isolated system.

```
1300 LDA current_drive
1310 STA command+3
1320 LDX #command MOD 256
1330 LDY #command DIV 256
1340 JSR oscli
1350 RTS
1360 :
1370 .normal_save
1380 JSR restore_registers
1390 .exit
1400 JMP (oldvec)
1410 :
1420 .restore_registers
1430 LDX zero:LDY zero+1:LDA #0
1440 RTS
1450 :
1460 \ Data
1470 :
1480 .oldvec
1490 OPT FNequw(0):]
1500 :
1510 IF break$<>b1$ THEN PROCbreak_data
1520 :
1530 [OPT pass
1540 .osfile_block
1550 OPT FNequw(0)
1560 OPT FNequd(0)
1570 OPT FNequd(0)
1580 OPT FNequd(0)
1590 OPT FNequd(0)
1600 :
1610 .osgbpb_block
1620 OPT FNequb(0)
1630 OPT FNequd(data)
1640 OPT FNequd(0)
1650 OPT FNequd(0)
1660 :
1670 .data
1680 OPT FNequb(0)
1690 .current_drive
1700 OPT FNequb(0)
1710 OPT FNequw(0)
1720 :
1730 .command
1740 OPT FNequs("DR."+CHR$(first_drive+
48))
1750 OPT FNequb(&0D)
1760 :
1770 .drive2
1780 OPT FNequb(second_drive+48)
1790 ]
1800 NEXT
1810 COLOUR 3:PRINT "Final address of m
achine code = ";
1820 COLOUR 1:PRINT "&";~P%
1830 CALL init
1840 ENDPROC
1850 :
1860 DEF PROCbreak
1870 [OPT pass
1880 \ Program BREAK key
1890 LDX #break MOD 256
1900 LDY #break DIV 256
1910 JSR oscli
1920 ]
1930 ENDPROC
1940 :
1950 DEF PROCstore_block
1960 [OPT pass
1970 \ Store osfile parameter block
1980 LDY #0
1990 .loop2
2000 LDA (zero),Y:STA osfile_block,Y
2010 INY:CPY #18:BNE loop2
2020 ]
2030 ENDPROC
2040 :
2050 DEF PROCrestore_block
2060 [OPT pass
2070 \ Restore osfile parameter block
2080 LDY #0
2090 .loop3
2100 LDA osfile_block,Y:STA (zero),Y
2110 INY:CPY #18:BNE loop3
2120 ]
2130 ENDPROC
2140 :
2150 DEF PROCbreak_data
2160 IF break$=b2$ THEN str$="?&"+STR$~
filev+"=&"+STR$~(start MOD 256)+"M?&"+$
TR$~(filev+1)+"=&"+STR$~(start DIV 256)
ELSE str$="*"+mc$
2170 [OPT pass
2180 .break
2190 OPT FNequs("KEY10 "+str$+"M")
2200 OPT FNequb(&0D)
2210 ]
2220 ENDPROC
2230 :
2240 DEF FNequb(byte)
2250 ?P%=byte
2260 P%=P%+1
2270 =pass
2280 :
2290 DEF FNequw(word)
2300 !P%=word AND &FFFF
2310 P%=P%+2
2320 =pass
2330 :
2340 DEF FNequd(double)
2350 !P%=double
2360 P%=P%+4
2370 =pass
2380 :
2390 DEF FNequs(string$)
2400 $P%=string$
2410 P%=P%+LEN(string$)
2420 =pass
2430 :
2440 DEF PROCsave
2450 $&900="SAVE :0."+mc$+" "+STR$~code
+" "+STR$~P%
2460 X%=0:Y%=9:CALL oscli
2470 COLOUR 3:PRINT""Machine code save
d as ";
2480 COLOUR 1:PRINT mc$
2490 ENDPROC
```

This listing is included in this month's tape & disc offer. See order form on Page 135.

Get it right!

```
 10 =     0 0
 20 =     0 0
 30 =     0 0
 40 = 9719 9
 50 = 7054 6
 60 = AEB7 1
 70 = A894 6
 80 = 126A 8
 90 = 90DB 9
100 = E9FC 0
110 = FD2E E
120 = 9719 0
130 = 30DB A
140 = 5E5E 8
150 = 5052 F
160 = D26C 8
170 = CBC6 E
180 = FF9C 1
190 = 9719 5
200 =     0 5
210 = 9AAA 3
220 = 9719 3
230 = DB66 9
240 = 77BC F
250 = 9516 E
260 =     0 E
270 = CC21 3
280 = ED0F 7
290 = 9719 1
300 = 7464 C
310 =   B17 2
320 = 5A43 0
330 = 5EFE D
340 = D691 8
350 = 980D 5
360 = 12A8 C
370 = ECF1 5
380 = A571 1
390 = 99E2 C
400 = 1737 A
410 = 5997 1
420 = 5017 E
430 = 1470 B
440 = A4C6 2
450 = FFF2 4
460 = 7F39 D
470 = CE97 2
480 = 6AEE 2
490 = 386D 2
500 = 39CF 7
510 = ED0F 9
520 = 9719 F
530 = 98A5 F
540 = 2AAD 4
550 = CCBD A
560 = 7942 C
570 = B43B A
580 = 3FB3 4
590 = 4E48 B
600 = 6272 E
610 = 9719 1
620 =     0 1
630 = 9B7B 7
640 = 10B2 B
650 = 9719 9
660 =     0 9
670 = E490 D
680 = 20FF 3
690 = 9719 C
700 = E759 0
710 = 9719 3
720 = 4E48 0
730 = 9843 5
740 = 9719 1
750 = 3208 B
760 = 9719 2
770 =     0 2
780 = 6551 7
790 = 9719 1
800 =     0 1
810 = 7A18 4
820 = 9719 1
830 =   C14 0
840 = 9719 B
850 = 4E48 D
860 =     0 D
870 = A37C E
880 = 3311 1
890 = 2EB0 2
900 = 5655 E
910 = 8278 7
920 = 9CF1 4
930 = 2F13 F
940 = 3DFF D
950 = 9719 6
960 =     0 6
970 =   F1A C
980 = 9E6F 9
990 = 6253 D
1000 = 3D8A 0
1010 = 9719 6
1020 =     0 6
1030 = 9719 D
1040 =     0 D
1050 = 571E C
1060 = BBB9 A
1070 = D853 7
1080 = 9719 D
1090 = 9CE0 2
1100 = D19C 5
1110 = 1397 D
1120 = 9719 4
1130 =     0 4
1140 = 9719 9
1150 =     0 9
1160 = ABD8 F
1170 = DB46 C
1180 = 571E 8
1190 = BBB9 5
1200 = 971E E
1210 = 9719 A
1220 = 2389 8
1230 = 9719 E
1240 = 4E48 4
1250 = 9CE0 A
1260 = E1FF 6
1270 = 1397 4
1280 = 9719 2
1290 =     0 2
1300 = 49CB 7
1310 = DB46 A
1320 = 571E 5
1330 = BBB9 1
1340 = D853 7
1350 = 9843 C
1360 = 9719 4
1370 = AC60 B
1380 = 9CE0 7
1390 = DC83 4
1400 = 8802 2
1410 = 9719 9
1420 = D77B 8
1430 =   BCC 3
1440 = 9843 9
1450 = 9719 2
1460 =     0 2
1470 = 9719 A
1480 =   503 5
1490 = 9608 5
1500 = 9719 E
1510 = 2D3D B
1520 = 9719 C
1530 = 4E48 4
1540 = 5417 8
1550 = C23B E
1560 = 4240 6
1570 = 4240 6
1580 = 4240 F
1590 = 4240 C
1600 = 9719 3
1610 =   AAE 2
1620 = 65D9 1
1630 = 80F2 7
1640 = 4240 3
1650 = 4240 D
1660 = 9719 4
1670 = 407E 2
1680 = 65D9 E
1690 = 9D54 8
1700 = 65D9 D
1710 = C23B 4
1720 = 9719 D
1730 = E454 1
1740 = 4739 A
1750 = 3B04 3
1760 = 9719 6
1770 = 7E01 4
1780 = 6C4B E
1790 = 8B58 A
1800 = 2C83 D
1810 = 862B 4
1820 = 95C9 0
1830 = 848F 4
1840 = ED0F E
1850 = 9719 4
1860 = 7384 3
1870 = 4E48 0
1880 =     0 0
1890 = D764 5
1900 = E886 5
1910 = D853 6
1920 = 8B58 6
1930 = ED0F B
1940 = 9719 5
1950 = 3C76 5
1960 = 4E48 4
1970 =     0 4
1980 = 9CF1 0
1990 =   372 9
2000 = 493A 0
2010 = 9947 5
2020 = 8B58 2
2030 = ED0F E
2040 = 9719 2
2050 = 6AF8 E
2060 = 4E48 1
2070 =     0 1
2080 = 9CF1 8
2090 = 1353 A
2100 = D5CA 3
2110 = 8966 0
2120 = 8B58 0
2130 = ED0F 6
2140 = 9719 C
2150 = 1334 8
2160 = BD84 2
2170 = 4E48 8
2180 = D2A4 3
2190 = EA76 2
2200 = 3B04 C
2210 = 8B58 D
2220 = ED0F F
2230 = 9719 3
2240 = DDF8 4
2250 = 24A9 7
2260 = 5569 E
2270 = D044 0
2280 = 9719 9
2290 =   986 3
2300 = 249E 1
2310 = 650A 9
2320 = D044 D
2330 = 9719 9
2340 = 2D11 5
2350 = 86DD C
2360 =   5CC 1
2370 = D044 4
2380 = 9719 8
2390 = 8EFA C
2400 = 4776 6
2410 = C308 A
2420 = D044 6
2430 = 9719 2
2440 =   EB7 C
2450 = F287 3
2460 = BB41 9
2470 = E670 C
2480 = 6234 3
2490 = ED0F 6
```

Rodent rhythmics

Exercise your mouse with Mike Cook's Archimedes aerobics routine

ONE of the nice things about having a new and powerful micro is that even simple programs can produce quite fascinating results. Here is such a routine, inspired by watching gymnasts doing their exercises with long streamers. Type the program in and run it. Enter the number of points required – say 200 – then move the mouse.

On screen a trail of colourful dots will grow for a short time, then the end will start to catch up with the front. The faster you move, the longer the trail.

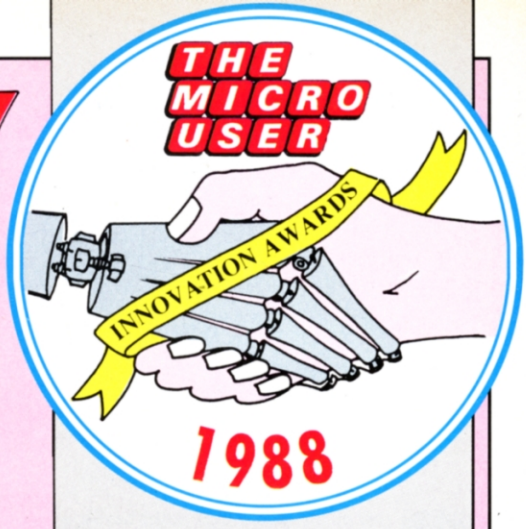
You set the number of points in the streamer as you start the program. The more points there are the longer the delay will be before it catches you up. With a value of 1,000 it's in the order of six seconds. Pressing any mouse button allows you to redefine this length.

By the way, the routine is also a good example of how the Archimedes can have local arrays in procedures and how these can be redimensioned.

But enough of the chat: Just type the listing in – it's not long – and take up your mouse to fly that streamer.

```
 10REM >STREAMER
 20REPEAT
 30MODE9
 40PRINT"STREAMER by Mike Cook"
 50INPUT"NUMBER OF POINTS TO USE ",N%
 60PROC_STREAM(N%)
 70UNTIL FALSE
 80END
 90DEF PROC_STREAM(N%)
100LOCAL X(),Y()
110DIM X(N%),Y(N%)
120MOUSE XM,YM,T%
130FOR A%=0 TO N%
140X(A%)=XM
150Y(A%)=YM
160NEXT
170LP%=0:P%=1:NP%=2
180REPEAT
190GCOL 0,RND(7)
200P%=P%+1
210IF P%>N% THEN P%=0
220LP%=LP%+1
230IF LP%>N% THEN LP%=0
240NP%=P%+1
250IF NP%>N% THEN NP%=0
260MOUSE XM,YM,T%
270MOVE X(P%),Y(P%)
280PLOT 7,X(NP%),Y(NP%)
290MOVE X(LP%),Y(LP%)
300DRAW XM,YM
310X(P%)=XM
320Y(P%)=YM
330UNTIL T%<>0
340ENDPROC
```

Take part in our nationwide search for innovation in action



Last year's Innovation Award was an outstanding success with more than 500 users of the BBC Micro competing for the prestigious accolade.

Entries came from all over the world, from health researchers, engineers, teachers and students – all with remarkable applications which pushed the BBC Micro to its limits and beyond. The press response was enormous with top coverage in hundreds of newspapers throughout the country.

Now you can join our search for the innovations of 1988. And this year the competition is twice the size, with a special section for Archimedes users.

HOW TO ENTER

Tell us what your BBC Micro or Acorn Archimedes is doing that is out of the ordinary. It may be a project with exciting commercial potential, with significant social benefit – or even just for fun. Whether you're an individual, group, school or business, this contest is open to you – there's no restriction.

Your typed entry should not exceed 500 words, and you can also include any supporting illustrative material such as black and white photographs, colour transparencies, diagrams or screen dumps.

Complete the coupon below, attach it to your entry and send it to arrive no later than October 14, 1988.

The two winners will be announced at the Electron & BBC Micro User Show at the New Horticultural Hall, Westminster, from November 11 to 13.

THE PRIZES

The winner in the BBC Micro category will receive a magnificent Archimedes, courtesy of Acorn. This 32-bit workhorse is the fastest micro in the world with 512k ram, 512k rom, 800k 3.5in disc drive, mouse and colour monitor. It comes with a Welcome disc containing an excellent painting package, a music editor and much more. Value: £1,034.

In the Archimedes category the prize will be a powerful Brother 1709 printer, supplied by Kelator, Acorn's distributor to the trade. The 1709 can output text in three different modes – draft, near letter quality and letter quality – at speeds of up to 240 cps. The package will also come with unique software to make the most of the Archimedes' special features. Value: £685.

And both winners will receive an impressive plaque in recognition of their achievements.

ENTRY COUPON

Name_____

Address_____

_____

_____ Postcode_____

Daytime tel. no._____

Occupation_____

Send to: ***The Micro User Innovation Awards 1988,***
Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.

MU10

Moon Patrol

Fight to survive in this space game by Andrew Cook

FAR out in uncharted space, surveying for mineral rich planets orbiting Aldagamma Four, you find traces of the precious Jagnite crystal used to provide energy for interstellar hyperdrive resonance units. Suddenly the alarms go wild as your ship is struck repeatedly by burning meteors, causing tremendous damage.

You go out of control and crash land on a planet's moon, leaving you without enough drive energy to escape. But all around you lie the Jagnite crystals, so you must venture out and collect enough to escape...

Every area you enter contains 15 crystals of similar resonance. You must take at least 10 from each – but your oxygen supply is limited. Out on the surface are unfriendly creatures whose merest touch will rupture your suit: The Fuzz chase you, the Winotrons roam around randomly, and the Scouts travel on set courses.

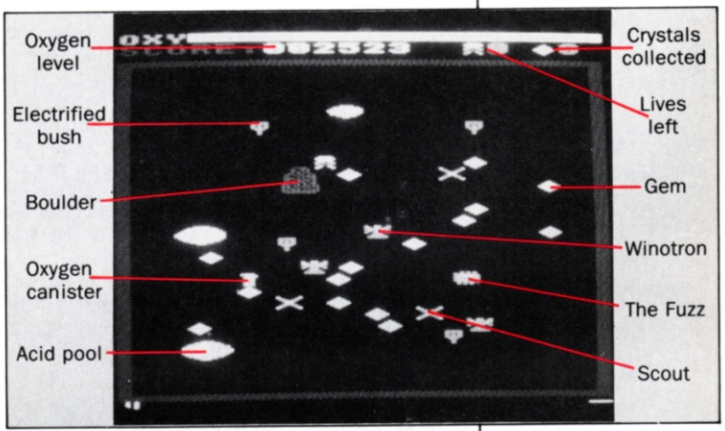
Watch out for the acid pools, electrified bushes and boulders and remember that the Fuzz can be lured into the acid pools at the expense of time and oxygen. The current area is marked by notches at the bottom of the screen.

Type in both listings saving the first as Patrol and the other as MOON2. Check both with Get it Right! and then CHAIN"Patrol" to run them.

CONTROLS	
Z	Left
X	Right
:	Up
/	Down
S	Sound on
Q	Sound off
DELETE	Pause
COPY	Unpause

VARIABLES

DIFF	Level number
LIVES	Number of lives remaining
S%	Score
GEM	Number of crystals collected
V%	Address of Fuzz
Z%	Address of Sid
NUM	Number of Fuzz
PNM	Current scout craft address
PAT	Maximum scout craft address
DELAY	Time delay
NR	Number of boulders
NE	Number of electric posts
O%	Oxygen remaining
SCORE(N)	High score table
SCORE$(N)	High score names
C	Current colour number



A typical screen during play

Listing I

```
   10 REM Moon Patrol - Listing I
   20 REM by Andrew Cook
   30 REM (c) The Micro User
   40 MODE7:VDU23,1,0;0;0;0;
   50 FORO%=0TO1:VDU129,157,131,141:PRIN
TTAB(15,0%)"Moon Patrol":NEXT
   60 PRINTTAB(10,3)CHR$134"Written by A
ndrew Cook"
   70 PRINTTAB(14,6)"Q - Sound off"TAB(
14)"S - Sound on"TAB(9)"DELETE - Pause"
'TAB(11)"COPY - Restart"
   80 PRINTTAB(6,12)CHR$131"Controls:"'
TAB(14)"Z - Left"TAB(14)"X - Right"TAB
(14)"/ - Down"TAB(14)": - Up"
   90 ENVELOPE1,129,0,0,0,0,0,0,0,-2,-2,
-2,100,0
  100 ENVELOPE2,1,5,-5,0,10,10,0,0,0,0,0
,20,20
  110 ENVELOPE3,0,1,-1,0,16,16,0,0,55,-2
,-4,126,126
  120 FORO%=&A00TO&ADF STEP4
  130 READ !O%:NEXT
  140 DATA&00001500,&14000014,&293F2A3F
  150 DATA&00280101,&163F153F,&00140202
  160 DATA&00002A00,&28000028,&1A050A00
  170 DATA&05051A10,&30250A0A,&05051A30
  180 DATA&30250A0A,&05051A30,&20250A0A
  190 DATA&00050A25,&1133110A,&04000022
  200 DATA&050F0540,&0C0C0505,&0A0F0A80
  210 DATA&0C0C0A0A,&22332205,&08000011
  220 DATA&00000580,&80050000,&150A0000
  230 DATA&00000A15,&2A050000,&0000052A
  240 DATA&00000A40,&400A0000,&41000000
  250 DATA&000041C6,&CDC64100,&41C6CDDA
  260 DATA&C9820000,&0082C9CE,&00000000
  270 DATA&00000082,&00000014,&00000000
  280 DATA&383C143C,&3C383838,&28281428
  290 DATA&28282828,&00000000,&00000000
  300 DATA&E5E5E550,&50E5E5E5,&C9CCCFF0
  310 DATA&F0CFCCC9,&C6CCCFF0,&F0CFCCC6
  320 DATA&DADADAA0,&A0DADADA
  330 VDU23,243,170,85,170,85,170,85,170
,85
  340 VDU23,244,168,80,168,80,168,80,168
,80
  350 VDU23,245,10,21,10,21,10,21,10,21
  360 VDU23,246,170,85,170,85,0,0,0,0
  370 VDU23,247,0,0,0,0,170,85,170,85
  380 VDU23,248,124,68,84,84,56,16,16,16
  390 VDU23,249,0,0,0,0,0,0,0,60
  400 VDU23,250,0,0,0,0,1,1,1,1
  410 VDU23,251,78,106,86,217,170,23,201
,182
  420 VDU23,252,0,0,0,0,128,128,128,128
  430 VDU23,253,1,1,1,3,3,2,3,3
  440 VDU23,254,90,173,85,182,173,210,11
7,255
  450 VDU23,255,128,128,128,192,192,64,1
92,192
  460 FOR L%=0TO2STEP2:P%=&1200:[OPT L%
  470 .display LDY#31:.loop:LDA (&70),Y
  480 EOR (&72),Y:STA (&70),Y:DEY
  490 BPL loop:RTS:.check LDY#0:STY&75
  500 STY&74:.loop2:LDA&74:BNE con
  510 LDA&75:CMP#&3D:BEQ con:CMP#5
  520 BEQ con:LDA(&70),Y:EOR(&72),Y
  530 BEQ con:CMP#5:BNE cont2:STA&75
  540 BNE con:.cont2 CMP#&3D:BNE cont3
  550 STA&75:BNE con:.cont3 STA&75
  560 CMP#&CD:BNE cont:CPY#13:BNE con
  570 STY&74:JMP con:.cont CMP#&38
  580 BNE cont4:CPY#14:BNE con:STY &74
  590 JMP con:.cont4 CMP#&C9:BNE con
  600 CPY#11:BNE con:STY&74:.con INY
  610 CPY#32:BNE loop2:RTS:.left LDA&72
  620 CMP#&20:BEQ lcont:LDY#1:.lt
  630 LDA(&70),Y:CMP#&AA:BEQ end:CMP#&FF
  640 BEQ end:CMP#&55:BEQ end:INY:CPY#7
  650 BNE lt:.lcont LDA&70:SEC:SBC#16
  660 STA&70:CMP#&F0:BCC end:DEC&71:RTS
  670 .right LDA&72:CMP#&20:BEQ rcont
  680 LDY#25:.lr LDA(&70),Y:CMP#&55
  690 BEQ end:CMP#&AA:BEQ end:CMP#&FF
  700 BEQ end:INY:CPY#31:BNE lr:.rcont
  710 LDA&70:CLC:ADC#16:STA&70:CMP#16
  720 BCS end:INC&71:.end RTS:.down
```

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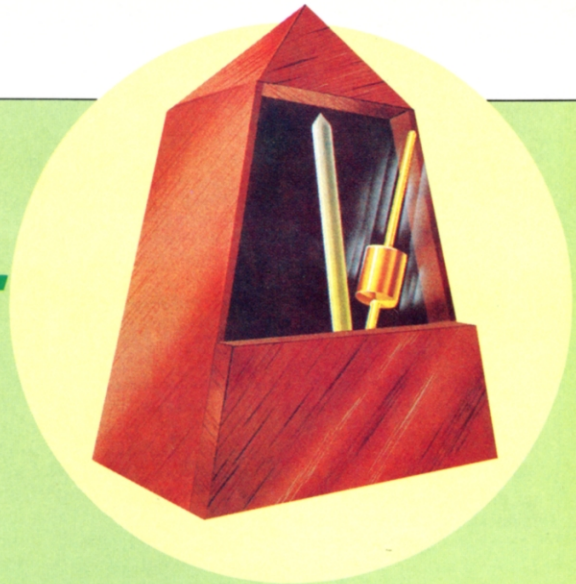
B B+ M



Making the final arrangements

Ian Waugh concludes his hands-on series exploring programming in Ample

> *'The system automatically looks for them and plays them together'*

OVER the past two months we've looked at inputting the various parts of your piece and how to control instruments with program segments rather than straight data. Now we'll order the music lines we have constructed – bass, chordriff and lead – into an arrangement. These are normally defined in words called part1, part2, part3 and so on because the system automatically looks for them and plays them together.

If you were experimenting with the simple part words given last month either delete them like this:

```
"part1"DELETE
```

or GET them into the Notepad and redefine them. Construct the part words shown in Figures I, II and III.

Let's see what's new here: The @ word sets a transposition in semitones. This can be positive or negative. To ensure all the parts play in tune each of the four sections has been transposed by the same amount – you can alter this if you want to.

SCORE cancels the transposition – it performs a 0@. If we want to transpose the bass line, therefore, we must remove SCORE from the bass word. Do that in the Notepad and reMAKE it. The FOR(...)FOR construction is Ample's equivalent of Basic's FOR..NEXT loop. In these parts each music section will play twice. Again, you can easily alter this, but first let's mix the piece.

Press f0 in command mode to call up the menu and select Mixing Desk. Press Tab to enter edit mode and you'll see seven instruments above the faders, all called simpleins. Press *r* to play the piece and mix it as it plays.

Select instruments, alter volumes and pan levels until you're happy with the result. If the music stops playing you can still continue mixing, but if you start it again by pressing *r* you will lose your mix.

You can carry on mixing from where you left off by entering MAKE. That will convert the current

```
Studio 5000 Notepad                    ID: 72350
got "part1" to make "part1"
trying "RETGATE"
SCORE K<-B>K
0@ 2FOR< bass >FOR
2@ 2FOR< bass >FOR
3@ 2FOR< bass >FOR
0@ 2FOR< bass >FOR
D/ ↑
%
```

Figure I: part1 word

```
Studio 5000 Notepad                    ID: 72350
got "part2" to make "part2"
trying "RETGATE"
SCORE K<-B>K
0@ 2FOR< chordriff >FOR
2@ 2FOR< chordriff >FOR
3@ 2FOR< chordriff >FOR
0@ 2FOR< chordriff >FOR
↑;
%
```

Figure II: part2 word

mix to a word which will be used when the piece next plays. A sample mix is shown in Figure IV. If you want to start with this, enter it in the Notepad, MAKE it as *mix* then go to the Mixing Desk and re-mix it to suit yourself. This shows how Ample words can be used across the editors.

Now all we have to do is dot the i's and cross the t's. As we go I'll suggest how you might experiment further with the program.

Let's look at echo which is used in part3 – it's just one of the special effects built into Ample. Others include autopanning, pitch sliding and, of course, you can easily define your own special effects words.

Echo takes two parameters: The first is the time delay between echoes which in this case is 12 – a semiquaver duration – but can be altered. The second parameter determines the number of voices to be used, in this case 3.

In the mix the echoes are played by the ringsyn instrument and bounce from one side of the stereo image to the other. In the Mixing Desk you could give each echo a different instrument and alter its stereo position.

We can detune the voices in a part – raising or lowering their pitch slightly in relation to the others. It can be used to produce effects ranging from a warm chorus ensemble to an out of tune honky tonk piano. Part3 uses three voices and its definition includes commands to detune the second and third voices. Experiment with different DETUNE values and try detuning the different voices in chordriff.

Notice the last line in part3: The *X* word has no pitch of its own and is used to restrike the last note played. It is primarily used in percussion scores to program drum rhythm patterns but here it is used to play the last pitch generated by the word random on the very last beat of the piece.

You may have noticed that when using some instruments, the last note sometimes hangs on: You probably stopped it by pressing Escape, but it can also be silenced by typing STOP. In the Staff Editor it is common practice to press *e* at the very end of a piece. This inserts an end line which appears in Ample notation as a rest with zero duration – try it. It is good practice to end each part with a rest to make sure no notes are hanging on and you'll see all the parts in this piece end with a rest.

If you find that *RANDL* does not seem to produce sufficiently random results, include the following as the first line of the random word:

```
RAND RAND!
```

RAND produces a random number in the range −32768 to 32767. RAND! seeds the random number generator, the Ample equivalent of Basic's RND(−X).

The notes used in random, rand1 and rand2 are arranged in sets of eight semiquavers. Put different notes in these sections or use ones of varying durations. If they don't add up to eight semiquavers, however, part3 will stop playing before or after part1 and part2.

A set of eight notes could be replaced with another word similar to rand1 or rand2 to give even more choices.

In chords, if the notes inside the brackets are

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Mixing Desk Editor Controls

Use the cursor keys to move around. If the block cursor is directly above a fader, pressing Shift and the up down keys will alter the volume. Shift and left/right will alter the pan or stereo position.

If the cursor is on an instrument, pressing Shift will display those available. Keep Shift pressed and use the cursor keys to move to another instrument, release Shift for a new one.

General	
Arrow keys	Move cursor.
r	Run piece.
Space	On/off pause.
g	On/off group.
f	Fast wind.
/	Step on one beat when paused.
Return	Play hit on current voice(s).
number 1-8	Play hit on numbered voice.
Cursor on tempo/tune	
Shift up/down	Increase/decrease by one.
Shift left/right	Increase/decrease by 10.
Copy	Reset to normal.
Cursor on instrument/voice controls	
Shift	Select instrument.
Shift up/down	Increase/decrease volume controls.
Shift left/right	Move left/right controls.

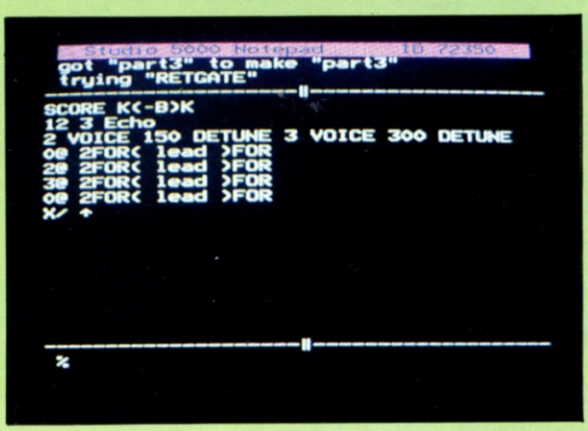

Figure III: part3 word

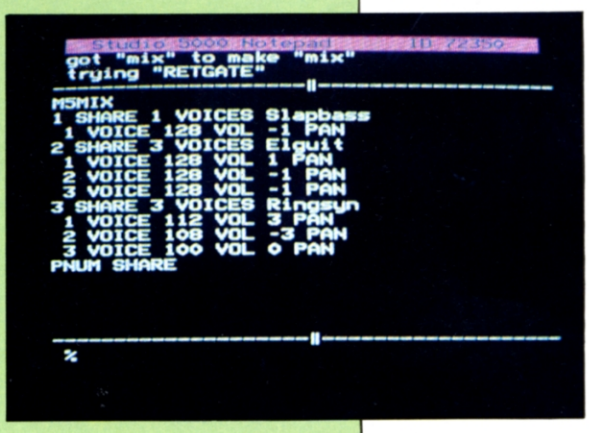

Figure IV: mix word

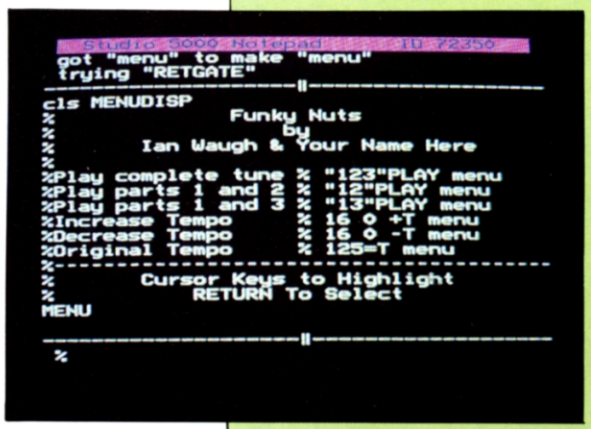

Figure V: menu word

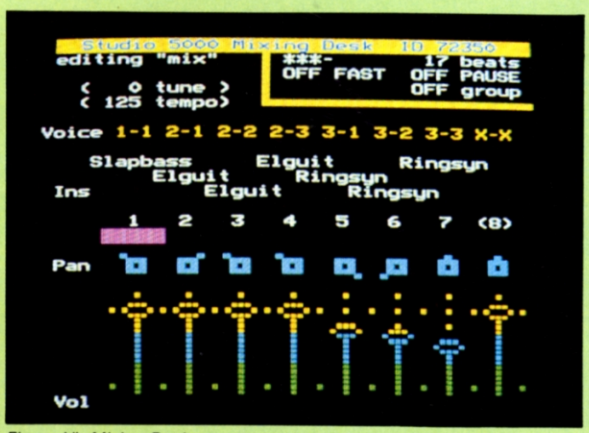

Figure VI: Mixing Desk

◀ *From Page 117*

preceded with a length like:

```
A(4,DF)
```

the chord will strum. A negative length will strum the chord downwards – backwards, actually. Try altering the note length.

At the moment accents are only used in the bass line. Insert accents in the other music lines and use more severe ones. Reduce =L and use pp and ff words throughout the sections.

You will notice that there is still a voice free in the Mixing Desk. Write another music line for it – use a similar layout to bass, for example, if you need a template – and assign it to part4. You'll have to tell the mix there's another part wanting to join it by entering:

```
4 SHARE 1 VOICES Simpleins
 1 VOICE 128 VOL 0 PAN
```

in the mix word. Alternatively, you can enter it in command mode in the Mixing Desk then enter MAKE.

When you're finally happy with your piece – or bored silly with it – it's standard practice to construct a word called RUN to set it playing. RUN is the only exception to normal user lower case word definitions. At its simplest the RUN word contains the number of the parts to play and an instruction to play them. For example, if your piece has three parts the word will be:

```
"RUN" ["123"PLAY]
```

If you want to include a few comments about the piece put them on lines beginning with %.

If you want something a little more flashy and user-interactive construct a menu. This is easy in Ample and a sample menu is shown in Figure V.

MENUDISP displays lines which follow it and which start with % as a menu screen. Normal % lines are simply printed on the screen. Those with a dividing % in the middle are option lines. The first part is shown as text and the second part is the command which will be executed when that option is selected. MENU runs the complete display as a menu.

You'll notice that all options return to the menu after execution. It's a simple matter to construct a ring of menus which call each other – the jukebox program on the system disc does this.

The last three options let you alter the tempo. The changes will take effect as the program is running. The first number in each is the amount of change in tempo in the range –128 to 127. The second is the number of beats of the current length over which the change will take place. You can therefore program accelerandos:

```
32 16 +T
```

and ritardandos:

```
32 16 -T
```

Ample supports oscli commands, so you could insert words, for example, to catalogue the disc:

```
"cat" ["CAT"OSCLI]
```

We have only just skimmed the surface of Ample by showing some of the ways in which a piece of music can be constructed using the editors. We've haven't touched upon defining instruments, creating percussion scores, negative – think about it – durations sub-mixes, unmixes or musical sub-sections.

Neither have we mentioned the Music 4000 keyboard, which can be used to enter music into the system in real-time or step-time. Or the new Music 2000 Midi interface, reviewed in our June issue.

Ample can create the slurs, dynamics, tempo changes and other nuances demanded by classical music. In rock or pop its program structures could let you produce a complete bass part from a few lines of music. These program structures can also be used to produce complex micro-generated music.

Ample opens up a whole new world of music possibilities and the deeper you delve into it the more you sense its potential and realise the limitations of other methods of music-making. At the moment it is only available for the BBC Micro and Electron and it is without doubt the most powerful music language ever created for any micro.

The Hybrid Music System is available from Hybrid Technology Ltd., Unit 3, Robert Davies Court, Cambridge, CB4 1TP. Tel: 0223 316910.

> *'. . . the most powerful music language ever created for any micro'*

Leaky Listing

THIS month the Leaky Listing – the program for you to debug – is another simple game. The guess the number program in the May issue proved very popular, so here's a find the word game – a sort of Hangman without graphics. You are allowed 10 guesses at letters in a word that the micro has chosen at random.

Right and wrong tries are displayed in two columns and the word is built up letter by letter as you get them right over a line of the appropriate number of dashes at the bottom of the screen.

There are five actual errors and several points of bad programming. Next month we'll give a list of the deliberate mistakes together with one or two hints for good programming.

We realise that there are better ways to write this simple program so why not send your version to *Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.* We'll pay £10 for the best one we publish.

```
  10 N=5:DIMW$(N),S%10
  20 FORI%=1 TO N
  30 READ W$(I%)
  40 NEXT
  50 X%=RND(TIME)
  60 M%=10:C%=1
  70 W$=W$(RND(N)):L%=LEN(W$)
  80 $S%=STRING$(L%," "):R%=FALSE
  90 CLS:PRINTTAB(8)"RIGHT"TAB(18)"WRON
G"
 100 PRINTTAB(5,21)STRING$(L%,"-")
 110 REPEAT
 120 C%=C%+1
 130 G$=GET$
 140 P%=0:FOR F%=1TOL%
 150 IFG$=MID$(W$,F%,1) P%=F%:PRINTTAB(
10,C%+1)G$:?(S%+P%-1)=ASC(G$)
 160 NEXT
 170 IFP%=0 PRINTTAB(20,C%+1)G%
 180 IF$S%=W$ R%=TRUE
 190 PRINTTAB(5,20)$S%
 200 UNTIL C%=M% AND R%=TRUE
 210 CLS
 220 IFR% PRINT"You guessed the word in
 "STR$(C%)" tries" ELSE PRINT"The word w
as "W$
 230 INPUT"Another go?"R$:IFR$="Y"GOTO6
0
 240 DATA COMPUTER,KEYBOARD,DISCS,TAPES
,MONITOR,PRINTER
```

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ARC MIDI INTERFACES EMR produce a range of interfaces for use with EMR programs using MIDI instruments, including MIDI (up to 4xMIDI in/out for 64 discrete channels, MINI Network to 8032 channels and SMPTE). EMR BBC Midi Interface also suitable when connected to I/O podule. Prices from £79.90

SOUNDSYNTH Lets you create some of the most exciting and complex sounds ever produced by a micro. A Waveform Filing System is provided to allow up to 32 sounds in memory at once. Designed for stand-alone use with your own BASIC, m/c programs, Arc Music Editor or as part of the ARPEGGIO system for using internal sounds with MIDI instruments. Add the Armadillo Sampler Podule and SOUNDSYNTH provides complete control of your own sound samples. Price £49.95

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SERIES

PROGRAM Library No. 20

Compiled by Steve Turnbull

YOUR submissions to the Library continue to flood in – thank you for them all. This month we have a couple of quickies. Just when you thought it was safe to use a READLN statement we present Pascal-protected input. There's a little line printer for those times when a word processor is just too much trouble and a whole collection of really useful functions for number crunchers.

Title: Functions
Language: Basic
Author: Cedric Dent

Here are a few simple self-contained functions which can be useful to any Basic programmer involved in manipulating numbers.

FNround(N,d%): Rounds the value of *N* to *d%* decimal places.

FNtrunc(N,d%): Truncates *N* at *d%* decimal places. If *d%* is zero *N* gets truncated to integer but if it's negative and *N* is an integer the last *d%* digits are truncated and replaced with zeroes.

FNdivtest(N%,n%): Checks whether *N%* is exactly divisible by *n%*, returning TRUE or FALSE.

FNprime(N%): Tests whether *N%* is a prime number, returning TRUE or FALSE.

PROCfactor(N%): Is a development of FNprime and prints out all the factors of *N%* in pairs. Interestingly, the more factors a number has the faster this routine works.

FNsim(a,b,c,d,e,f): Is the final feature: A simultaneous equation solver. Given two equations like the ones following it returns the values of x and y in the two variables *x* and *y*.

```
ax+by=c
dx+ey=f
```

The function returns TRUE if there is a unique solution or FALSE if none.

Due to inaccuracies in floating point calculations the round and truncate functions occasionally produce numbers such as 4.0000001 instead of 4.

```
   10 REM Functions
   20 MODE7:Z%=RND(-TIME)
   30 REPEAT CLS:@%=16
   40 N=RND(1)*10^RND(5)
   50 F%=RND(5)-1
   60 PRINT;N" rounded to ";F%" pl
aces:"FNround(N,F%)
   70 PRINT;N" truncated to ";F%"
places:"FNtrunc(N,F%)
   80 J%=RND(180)+20:K%=RND(5)
   90 D%=FNdivtest(J%,K%):a$=" can
"
  100 IF NOTD% a$=a$+"t"
  110 PRINT;J%a$" be divided by ";
K%
  120 K%=(INTRND)AND&FFFF
  130 D%=FNprime(K%):a$=" is"
  140 IF NOTD% a$=a$+"n't"
  150 PRINT;K%a$" prime"
  160 IF NOTD% PROCfactor(K%):*FX1
5
  170 PRINT"Next?";
  180 UNTIL NOTGET=0
  190 :
  200 DEF FNround(N,d):d=10^d
  210 N=N+.5/d:=INT(d*N)/d
  220 :
  230 DEF FNtrunc(N,d%)
  240 d%=10^d%:=INT(d%*N)/d%
  250 :
  260 DEF FNdivtest(N%,n%)
  270 =(INT(N%/n%)*n%)=N%
  280 :
  290 DEF FNsim(a,b,c,d,e,f)
  300 IF a*e-b*d=0 x=0:y=0:=FALSE
  310 x=(c*e-b*f)/(a*e-b*d)
  320 y=(a*f-c*d)/(a*e-b*d)
  330 =TRUE
  340 :
  350 DEF FNprime(n%)
  360 IF n%<4 =TRUE
  370 IF (n%MOD2)=0 =FALSE
  380 LOCAL d%,f%,r%:d%=3
  390 REPEAT r%=n% MOD d%
  400 IF r%=0 f%=FALSE:d%=n%:ELSEI
F (d%*d%)>n% f%=TRUE:d%=n%
  410 d%=d%+2:UNTIL d%>n%:=f%
  420 :
  430 DEF PROCfactor(N%)
  440 LOCAL D%,F%:D%=2:F%=N%DIV2
  450 REPEATIFN%MODD%ELSEF%=N%DIVD
%:PRINTD%" & ";F%
  460 D%=D%+1:UNTIL D%=F%
  470 IF F%=-1 PRINT"-- PRIME --"
  480 ENDPROC
```

Get it right!

```
  10 =    0 0 | 170 = 61FE F | 330 = 453B 2
  20 = 136B B | 180 = 61F9 7 | 340 = 9719 A
  30 = C6A4 9 | 190 = 9719 6 | 350 = D606 B
  40 = 1690 4 | 200 = FA70 E | 360 = D8EF D
  50 = 64E6 6 | 210 = 33BE E | 370 = CC1C 5
  60 = 4CEA 7 | 220 = 9719 2 | 380 = 8E9B D
  70 = 66F1 F | 230 = E9D9 4 | 390 = C76D C
  80 = B85F 8 | 240 = F5E8 C | 400 =  108 1
  90 = A7D3 9 | 250 = 9719 F | 410 = F8F3 D
 100 = B412 A | 260 = 7904 3 | 420 = 9719 9
 110 =  B83 1 | 270 = 563D 4 | 430 = 5ED8 1
 120 = 267D 5 | 280 = 9719 2 | 440 = D2F6 1
 130 = 1764 C | 290 = 1267 3 | 450 = 23FE A
 140 = CF13 A | 300 = 63B4 9 | 460 = 94B6 6
 150 = 5938 8 | 310 = 3D76 5 | 470 = B680 7
 160 = A3DF 3 | 320 = 8D05 7 | 480 = ED0F 6
```

Title: Line Printing
Language: Basic
Author: J.R.G. Twisleton

Sometimes using a word processor to print labels and short lines of text can take a disproportionate amount of time.

This short Basic routine allows you to input single lines of text and set them up against a ruler – also shown on screen – so that you can print quickly.

The four menu options are Input, Print, Toggle line spacing and Quit. The function of the first two is quite clear, the third switches between single and double line spacing.

Mode 3 has been chosen as it comes closest to presenting a wysiwyg display – but you can use other modes if it's clearer.

Points of interest are:

- The use of INPUTLINE, which accepts the whole input, including commas, into one string variable.
- The toggling between single and double line spacing using EOR3 – this affects the bits within *LS%* directly:

Decimal	Binary	EOR3	Result
1	01	11	10
2	10	11	01

- And the use of *FX3,10 to send any printed text direct to the printer only without the need for VDU2, VDU1, or VDU3.

```
   10 REM Line Printing
   20 REM -------------
   30 MODE3:L$="":LS%=1
   40 ON ERROR PROCerror
   50 REPEAT:CLS
   60 PRINT'SPC3"Line spacing is:
";LS%
   70 PROCformat:PRINT" "+L$
   80 PRINT'SPC4"I)nput line"SPC4
"P)rint line"SPC4"T)oggle line sp
acing"'SPC4"Q)uit"
   90 REPEAT
  100 I%=INSTR("IPTQ",CHR$(GETAND&
DF))
  110 UNTIL I%>0
  120 IF I%=1 INPUTLINEL$
  130 IF I%=2 PROCprint
  140 IF I%=3 LS%=LS%EOR3
  150 UNTIL I%=4:END
  160 DEF PROCprint:*FX3,10
  170 PRINTSPC1L$;
  180 IF LS%=2 PRINTSPC1
  190 PRINTSPC1:*FX3,4
  200 ENDPROC
  210 DEF PROCformat:LOCAL a$,c$
  220 a$="0123456789":c$="012345"
  230 PRINTSPC1STRING$(7,a$)c$'SPC
2;
  240 FORJ%=1TO7:PRINTSPC9;J%;
  250 NEXT:PRINT:ENDPROC
  260 DEF PROCerror:*FX3,4
  270 IF ERR=17 ENDPROC
  280 REPORT:PRINT" at line ";ERL:
END
```

Get it right!

```
  10 =    0 0 | 110 = 375F D | 210 = 35DE 9
  20 =    0 0 | 120 = ACED 9 | 220 = 8BF1 3
  30 = A164 4 | 130 = 15C9 A | 230 = DD1A 6
  40 = 9621 7 | 140 = EE82 2 | 240 = 9898 B
  50 = 98EA B | 150 = 6774 8 | 250 = 8D07 F
  60 = 73DA 3 | 160 = 1E75 C | 260 = 85FA D
  70 = C941 A | 170 = 213B D | 270 =  E65 D
  80 = 7959 0 | 180 = C4C0 B | 280 = FA32 7
  90 = BFBA 1 | 190 = B4E4 3 |
 100 = 68EE B | 200 = ED0F B |
```

Title: Protected Input
Language: Pascal
Author: John Derry

Pascal is a very popular language in higher education because it is relatively simple and forces programmers to think logically. It's a compiled language, which means you can't just sit down at the keyboard, write a program and run it to see what happens – you have to work your algorithm out in advance.

However most programmers soon develop their own library of routines and here are a few of mine which match Teri Paul's Basic versions from Library No.1 – March 1987.

The two functions are *getchar* which corresponds to GET in BBC Basic, and *inchar()* for accepting a key input from a certain set – it beeps if the key pressed does not match the list provided.

The code given here cannot be ported to other machines running Pascal because of the non-standard routines: VDU(), CODE0() and *&* for hex.

Since these are used solely in the most basic functions, only these primitives need be changed when porting elsewhere.

Even if you don't know Pascal you should be able to see how the program works – one of the major features of Pascal is its readability.

```
PROGRAM Inchar_Test(INPUT,OUTPUT);

CONST osrdch = &FFE0 ;
VAR quit  : BOOLEAN ;
    reply : CHAR ;

(********** Utilities ++++++++++*)

FUNCTION getchar : CHAR ;
  BEGIN
    getchar := CHR(CODE0(osrdch,0,
0,0) MOD &100)
  END ;

FUNCTION inchar(selection : SET OF
 CHAR)
 : CHAR ;
  VAR reply : CHAR ;
  BEGIN
    REPEAT
      reply := getchar ;
      IF NOT (reply IN selection)
THEN VDU(7) ;
    UNTIL reply IN selection ;
    inchar := reply
  END ;

(******** MAIN PROCEDURES +++++++*)

PROCEDURE archive ;
  BEGIN
    WRITELN('Archiving data')
  END ;

PROCEDURE process ;
  BEGIN
    WRITELN('Processing data')
  END ;
PROCEDURE readindata ;
  BEGIN
    WRITELN('Reading data')
  END ;

(************* MAIN *************)
BEGIN
  quit := FALSE ;
  WRITELN('Enter A)rchive, P)roces
s, R)ead data or Q)uit') ;
  REPEAT
    reply := inchar(['A','P','R','
Q']) ;
    CASE reply OF
      'A' : archive ;
      'P' : process ;
      'R' : readindata ;
      'Q' : quit := TRUE
    END ;
  WRITELN ;
  UNTIL quit
END.
```

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```
730 LDA#1:STA&75:LDA&72:BNE dcont
740 LDY#15:.ldo LDA(&70),Y:CMP#&AA
750 BEQ end:CMP#&FF:BEQ end:CMP#&55
760 BEQ end:TYA:CLC:ADC#8:TAY:CMP#31
770 BNE ldo:.dcont LDA&71:CMP#&7B
780 BCS end:LDA#0:STA&75:INC&71:INC&71
790 LDA&70:CLC:ADC#&80:STA&70:CMP#&80
800 BCS end:INC&71:RTS:.up LDA#1
810 STA&75:LDA&72:BNE ucont:LDY#8
820 .lu LDA(&70),Y:CMP#&AA:BEQ end
830 CMP#&FF:BEQ end:CMP#&55:BEQ end
840 TYA:CLC:ADC#8:TAY:CMP#24:BNE lu
850 .ucont LDA&71:CMP#&3A:BCC end
860 LDA#0:STA&75:DEC&71:DEC&71:LDA&70
870 SEC:SBC#&80:STA&70:CMP#&80:SBC#&80
880 BCC end3:DEC&71:.end3 RTS:.wino
890 LDA&7F:STA&76:LDA#&B:STA&77:.wloop
900 LDY#3:LDA(&76),Y:INC&296:SEC:SBC#1
910 STA(&76),Y:BNE wino2:LDY#3:LDA&296
920 CLC:AND#7:ADC#2:STA(&76),Y:DEY
930 LDA &296:ROR A:ROR A:ROR A:ROR A
940 AND #7:STA(&76),Y:.wino2 LDY#0
950 LDA (&76),Y:STA &70:INY:LDA(&76),Y
960 STA &71:LDA#&40:STA&72:LDA#&A
970 STA&73:JSR display:LDY#2
980 LDA (&76),Y:STA&78:CMP#0:BNE n
990 JSR up:JMP n8:.n LDA&78:CMP#1
1000 BNE n2:JSR right:JSR up:JMP n8:.n2
1010 LDA&78:CMP#2:BNE n3:JSR right
1020 JMP n8:.n3 LDA&78:CMP#3:BNE n4
1030 JSR down:JSR right:JMP n8:.n4
1040 LDA&78:CMP#4:BNE n5:JSR down:JMPn8
1050 .n5 LDA&78:CMP#5:BNE n6:JSR down
1060 JSR left:JMP n8:.n6 LDA&78:CMP#6
1070 BNE n7:JSR left:JMP n8:.n7 LDA&78
1080 CMP#7:BNE n8:JSR left:JSR up
1090 .n8 JSR display:LDY#0:LDA &70
1100 STA (&76),Y:INY:LDA &71:STA(&76),Y
1110 LDA &76:SEC:SBC#4:STA&76:BCC end2
1120 JMP wloop:.end2 RTS:.patrol
1130 LDA#&60:STA&72:LDA#&A:STA&73
1140 LDA#&80:STA&76:LDA#&B:STA&77
1150 .patloop LDY#1:LDA(&76),Y
1160 BEQ patcont:DEY:LDA(&76),Y:CLC
1170 ADC#1:STA(&76),Y:INY:CMP(&76),Y
1180 BNE patcont:LDA#0:DEY:STA(&76),Y
1190 LDY#3:LDA(&76),Y:STA&70:INY
1200 LDA(&76),Y:STA&71:JSR check:LDA&75
1210 CMP#&55:BEQ wipe:CMP#&AA:BEQ wipe
1220 CMP#&FF:BEQ wipe:JSR display:LDY#2
1230 LDA(&76),Y:CMP#0:BNE p1:JSR up
1240 LDA&75:CMP#0:BEQ p4:JSR display
1250 JMP wipe:.p1 CMP#1:BNE p2:JSRright
1260 JMP p4:.p2 CMP#2:BNE p3:JSR down
1270 LDA &75:CMP#0:BEQ p4:JSR display
1280 JMP wipe:.p3 CMP#3:BNE p4:JSR left
1290 .p4 JSR display:LDY#3:LDA&70
1300 STA(&76),Y:INY:LDA&71:STA(&76),Y
1310 .patcont LDA&76:CLC:ADC#5:STA&76
1320 CMP&7E:BEQ end4:JMP patloop:.end4
1330 RTS:.wipe LDA#0:LDY#1:STA(&76),Y
1340 JSR display:JMP patcont:]:NEXT
1350 W%=wino:T%=patrol
1360 M%=display:H%=check
1370 D%=down:L%=left:U%=up:R%=right
1380 VDU31,0,24,132,157,134,136
1390 PRINTSPC12"Press SPACE";
1400 REPEAT UNTIL INKEY-99
1410 VDU28,10,22,27,20:PAGE=&1500
1420 CHAIN"MOON2"
```

Get it right!

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = A8DF F
 50 = F823 4
 60 = 63CA 0
 70 = 4419 0
 80 = AF2A 5
 90 = 1331 D
100 = E1FE 1
110 = F28D 3
120 = 62AC C
130 = 716E 6
140 = E53C F
150 = 778B 9
160 = DFAD B
170 = 288E 3
180 = 6446 4
190 = CE1C 4
200 = DBD4 4
210 = 7642 8
220 = D34E D
230 = 6679 1
240 = 62A1 0
250 = FCEA D
260 = 199B F
270 = 9635 4
280 = 2071 8
290 = E48B B
300 = E8D8 0
310 = F445 0
320 = 5B1C D
330 = D0DB 9
340 = C57D 9
350 = CCFB A
360 = 8751 6
370 = 7272 7
380 = E1A7 0
390 = E3C5 6
400 = 619B 1
410 = 98C1 7
420 = EEAB A
430 = 8E3C 4
440 = E732 3
450 = 99F3 7
460 = CC7E 5
470 = 5AAA 4
480 = 25B7 8
490 = AB18 5
500 = 9545 7
510 = 5CC0 9
520 = 3E0D 8
530 = 2A3C 2
540 = 7F3E 5
550 = C5C8 9
560 = 4B08 6
570 = E761 3
580 = B5BF 8
590 = 22C2 5
600 = 3DBA D
610 = 56B1 E
620 = A459 C
630 = A51D F
640 = 6515 C
650 = 7471 A
660 = 5A8A E
670 = 690B D
680 = 822E 0
690 = 36B4 6
700 = DA58 4
710 = DD31 B
720 = 64DC 0
730 = 923E E
740 = A7FA 1
750 = A731 4
760 = 5A96 E
770 = D1AC F
780 = C945 C
790 = 5D2B A
800 =  ECA 3
810 = 3078 1
820 = 9EB1 F
830 =  ACF A
840 = 4DE5 0
850 = 2D10 D
860 = A44A 2
870 = 267D 6
880 = C984 8
890 = FB8E A
900 = 9254 0
910 = 7364 3
920 = 1682 3
930 = B37A 0
940 = E890 6
950 = A660 E
960 = 773F 6
970 = D793 A
980 = 8995 A
990 = 261A 0
1000 = D82E A
1010 = 8C8E E
1020 = DF7C A
1030 = 8121 0
1040 = 52D6 E
1050 = CBB9 9
1060 = E60C 1
1070 = 3AC3 C
1080 = 9242 9
1090 = 60F1 E
1100 = CEA0 7
1110 = 3944 1
1120 = DD34 9
1130 = C93D 6
1140 = 8C5E D
1150 = EA80 1
1160 = BCE7 4
1170 = AC84 A
1180 = AF02 0
1190 = 6753 A
1200 = 8EC8 E
1210 = 8AD0 C
1220 = 629E E
1230 = E73C B
1240 =  AC3 5
1250 = BE26 7
1260 = D0C8 B
1270 = 7BD6 4
1280 = 86D0 A
1290 = E654 B
1300 = 21B3 B
1310 = B220 8
1320 = 6056 D
1330 = 4496 5
1340 = FD6D C
1350 = 1336 5
1360 = 18D3 0
1370 = EFA1 F
1380 = 3658 6
1390 = 9324 E
1400 = AD81 F
1410 = F68A 4
1420 = 7423 2
```

Listing II

```
  10 REM Moon Patrol - Listing II
  20 REM by Andrew Cook
  30 REM (c) The Micro User
  40 MODE2:VDU23,1,0;0;0;0;:*fx4,1
  50 DIMscore$(10),score(10)
  60 FORO%=1TO10:score$(O%)="The Patrol
":score(O%)=(11-O%)*1000:NEXT
  70 VDU19,15,1;0;:ON ERROR GOTO 2260
  80 diff=1:LIVES=2:S%=0
  90 PROCdemo:VDU26
 100 IF diff>24 diff=1
 110 PROCinit:PROCheadings
 120 ?&7E=(PAT MOD 256)+5
 130 ?&7F=wino% MOD 256
 140 PROCobjects
 150 PROCcave
 160 PROCacid(RND(3))
 170 FORO=&B00TO wino% STEP 4
 180 PROCdp(O,&40)
 190 O?2=RND(7):O?3=RND(10)+1:NEXT
 200 FORO=&B80TO PAT STEP5
 210 ?O=0:O?1=RND(5):O?2=RND(4)-1
 220 PROCdp(O+3,&60):NEXT
 230 FORO=&84 TO num STEP4
 240 PROCdp(O,&20)
 250 ?O=?&70:O?1=?&71:O?2=(O-&7C)/4
 260 O?3=0:NEXT
 270 FORO=1TO15:PROCdp(&70,&80):NEXT
 280 PROCdp(&70,&A0):PROCdp(&80,0)
 290 !&80=!&70
 300 FORO=1TO8:SOUND1,-10,100,1:CALLM%:
FORI=1TO500:NEXT:NEXT
 310 SOUND3,2,0,1
 320 !&70=!&80
 330 IFINKEY-90 REPEATUNTILINKEY-106
 340 IFINKEY-98 CALLM%:CALLL%:CALLM%:GO
TO360
 350 IFINKEY-67 CALLM%:CALLR%:CALLM%
 360 IFINKEY-105 CALLM%:CALLD%:CALLM%:G
OTO380
 370 IFINKEY-73 CALLM%:CALLU%:CALLM%
 380 !&80=!&70
 390 CALLH%
 400 IF?&74=11 PROCairbonus:diff=diff+1
:GOTO100
 410 IF?&74<>13 GOTO470
 420 ?&72=&80:CALLM%:SOUND1,1,200,1:GEM
=GEM+1:COLOUR2:PRINTTAB(18,1);GEM;
 430 IFGEM=15 SOUND2,1,230,1:S%=S%+100*
diff
 440 S%=S%+100:PROCscore(S%)
 450 IF GEM=10 SOUND2,1,100,1:PROCdp(&7
0,&C0)
 460 GOTO490
 470 IF?&75=&3D OR ?&75=5 GOTO880
 480 IF?&74=14 ?&72=&A0:CALLM%:PROCair
 490 Z%=(?&80+256*?&81)-&3000
 500 FORO=&84TO num STEP4
 510 O?3=O?3+1:IFO?3<O?2 GOTO660
 520 O?3=0
 530 IFO?2=0 GOTO660
 540 !&70=!O
 550 ?&72=&20:?&73=&A
 560 V%=(?&70+256*?&71)-&3000
 570 CALLM%
 580 IF V%MOD640<Z%MOD640CALLR%:GOTO600
 590 IF V%MOD640>Z%MOD640CALLL%
 600 IF V%DIV640<Z%DIV640CALLD%:GOTO620
 610 IF V%DIV640>Z%DIV640CALLU%
 620 CALLM%
 630 CALLH%
 640 IF?&75=&3D CALLM%:O?2=0:SOUND2,3,1
,10:S%=S%+500:PROCscore(S%)
 650 ?O=?&70:O?1=?&71
 660 NEXT
 670 PNM=PNM+5:IF PNM=PAT PNM=&B80
```

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● Wanted for BBC B V22 and V22 Bis Modem, manual necessary, no software needed Tel: 0869 245024 (William).

● Wanted Computer Concepts Spellmaster ROM for Model B £25 Tel: Keith 0482 812416.

● BBC B Series 7 Acorn DFS, OS 1.20 £200 and BBC B Series 4, Acorn DFS, ADFS, View, OS 1.20 £200 Tel: 01-928 9292 Ext.2250 daytime.

● Microvitec 1431 colour monitor with P.A.L input and T.T.L for BBC £120 Tel: 01-870 0526.

● BBC B as new boxed, BBC data recorder joysticks, loadsa software, £195 Tel: 01-550 0067.

● Master 128 £250. Acorn Z80 second processor with software £150. Twin 40/80 Track disk drive £110 Tel: 01-398 7903.

● Z88 boxed with mains adaptor, 128K RAM PCLINK unused, boxed as new £225 Tel: Burton 0283 31113.

● For sale AMX MAX- £12, AMX Superart- £35. Bought Feb 88'. Tel: 031-447 7277 ask for Michael

● BBC B 120 games, cassette recorder, joystick, Wordwise, complete with cabinet £300 Tel: 01-524 2507.

● Watford Le Modem complete with leads, manual and ROM £54 Tel: Gillingham (KENT) 370707.

● Electron and Plus one for sale also thirteen games, needs RGB lead. £45 O.N.O Tel: 0602 229820 after 6pm.

● Discs, Graphic adventure creator £15. Impact £6. Gold collection £12.50 Bug-byte. Music synthesiser tape £3 Tel: 0258 87398.

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● BBC Master 128 never been used £335 details. Tel: Bedford 0234 856050.

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● BBC B, DFS, Cumana drive, colour monitor, teletext adaptor, AP-100A printer, joystick, view, replay, software, £375 Tel: 0322 66017.

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● BBC computer Watford DDFS, 40/80 disk drive PSU interword, Dump-out 3, Computer Concepts Spellmaster, Watford sideways ROM board £375 Tel: 0634 48062.

● Monitor Colour medium-res electrohome BBC B compatible 4 years old Tel: 01-3468194.

● Modem Nightingale Commstar £50 or exchange for teletex adaptor Tel: 0268 767123 Wickford Essex.

● BBC B, DFS, 40T drive, ROM board, tape recorder, 50 blank discs, replay, Dr. Who, 16K SWR, Wordwise, mouse, joystick, loadsa mags, games, utilities, cost over £1000 sell £450 O.V.N.O Tel: 061-7613534.

● Archimedes A310 with second internal drive 10 blank discs including Zarch. All original packing £850 Tel: 01-572 2917.

● Master compact with second internal drives £265 also Cumana CD 358 twin 3.5" disc drive + PSU formatting disc and cables £145 Blank discs included Tel: 01-572 2917.

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● BBC B 1.2 OS, DFS. Wordwise with Pace dual drive 40T and Star Gemini 15X Dot matrix wide carriage printer, all manuals as new £395 Tel: 0869 248589.

● Juki 6100 daisywheel printer with cut sheet feeder virtually unused boxed. Superb condition £350 O.N.O Tel: 0799 24224.

● Master Compact RS232 chips, TV modulator + software including View, ABC, Logo, Imogen. £310. Tel: 0539 821562.

● Wanted back issues of Micro User June to September 1986 Tel: 0742 745327 ask for Steve Chapman.

● Juki 6100 daisywheel printer £225 O.N.O Tel: Halifax 0422 73058 (evenings).

● Epson LQ800 24 pin letter quality printer hardly used £375 O.N.O Tel: 0323 845762 (answerphone).

● Z80 second processor £160. Z80 Turbo Pascal £22. Disc drives 40/80 powered £130. Wordwise Plus Toolkit, Exmon II, Accerelator, Speech processor, CC speech rom, realtime clock, light pen, plus books, games, magazines, list available. Tel: 07618 521.

● Wanted ADI, Master Turbo co-processor, Tel: 0332 662955.

● Disc drive Canon 40T D/S VGC £45 Tel: 0268 771477.

● BBC Master 512 plus Dual 400K 80/40T double sided discs drives and Microvitec, colour monitor, medium resolution also various software £500 for the complete system. Tel: 061-434 1120.

● 1170 disc interface upgrade, unused £35. Tel: 0294 52250 Evenings.

● Watford 40/80 track DS/DD disc drive (5.25" disc) £90. Note the drive without own PSU. Tel: Saqib 061-431 3045.

● BBC B, issue 7, DFS, 40Tk Cumana drive, 32K SWR, EPROM programmer, UVIPROM, software, books, exellent condition £330 O.N.O Tel:0487 812346.

● Microvitec 1451 £175, Acorn 100K drive £30. Tel: 0227 471678 Evenings.

● BBC Technomatic PD800P, 5.25" dual drives 40/80 switchable 800K/1280K with integral mains power supply and monitor stand £150 Tel:01 422 2014 After 5.30pm.

● For sale 310m colour + teletext adaptor + Zarch + Arcwriter £1200. Master 512 co-processor £125 3 DS/80/40 track disc drives £60 each Tel: 0603 812388 after 6pm.

● Watford Quest paint and mouse £30. Solidisk 1772 + 8271 DFDC £14. Window matic £8 Tel 01-858 6086 Evenings.

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● Master 128, 65C102 2nd Proc, Interword, Spellcheck, Plus multi, Font NLQ, Printmaster £390. Tel: 01 647 0668 (Wallington, Surrey) evenings.

● Acorn Electron, Plus 1, Plus 3, View, Viewsheet, manuals, boxed, excellent condition £180. Tel: 07072 61655 (Herts) evenings.

● Solidisk 256k 4meg board + 32K Manager Rom + software £80. Interword Rom £35. Both £100. Tel: Glasgow (041) 641 1200.

● BBC B issue 7 ADFS as new £225. Tel: 01 992 2592.

● BBC Master Compact, only 12 months old with disc drive and RGB colour monitor. Also software including joystick and several games and discs. All for just £635. Tel: Mankash Jain after 5pm at Walsall (0922) 645772.

● 6502 2nd processor with Hi Basic Rom £65. Beebug Spellcheck II £20. Exmon II £20. Toolkit+ £20. All with manuals. Tel: F H Bradford 0736 788249.

● BBC B DFS three disc drives. Hardisk Rom/Ram expansion prommer, mouse, joystick etc. All extras loads software. Tel: 0992 716171.

● BBC B, OS 1.2, Opus 40/80T drive with DDOS, Wordwise, Beebplot, all manuals £275 o.n.o. CTI CP80 printer £150 o.n.o. Excellent condition, could deliver. Tel: Newbury (0635) 45263 evenings.

● BBC B, green monitor, Pace modem, Cumana DSDD drive, joysticks, Solidisk DFS and 2 Meg128 Ram/Rom board. Interword, Intersheet, View and Commstar Roms. Valuable software, manuals and books £350. Tel: 01 368 3279 evenings.

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● BBC B, colour monitor, printer, Challenger Ram drive, Ram/Rom board, Speech, Datacorder, desk books £500. Tel: 061 434 2746.

● All for BBC "B": 2nd Processors; 6502 £60; Z80 complete £110; Prestel £40; Bit-Stick £40; HCR external Rom box £50; ATPL Ram/Rom + Sidewise £25; Viglen case £20; Viglen sideways Rom sys £10; 100k disc drive £40; Spares: Keyboard £25; Micro case (top+base) £20; Power unit £30; Software: BCPL £30; Logo £32; Iso Pascal £32; Microtext (disc) £25; Sleuth £12; Toolkit Plus £12; Printmaster (Epson) £10; Elite £8; Watford DFS + manual £14. Electron + Plus 1 + View £70. Full sets Micro User & Acorn User - offers. Tel: 0727 59450.

● 40MB Winchester disc. Solidisk £250 will deliver and install within 100 miles. Also Opus twin 40/80 track drives £100. Tel: Preston (0772) 34894.

● Epson MX80 printer, little used with cable £75. Tel: 01 907 4535 after 6pm.

● Wordwise Rom £15; Acornsoft Snapper, Music Philosopher's Quest on cassette, Micro User 1984 cassettes, other tapes: Offers. Tel: 0902 752666.

● Electron Plus 1 RGB lead and Aerial lead, comes with box, tons of mags and software and books and manual £200 o.n.o. Tel: 0778 343344 (Market Deeping).

● BBC B Watford DFS 40/80 DS DD drive, sideways Rom, EMR Midi interface and software over £400 worth software + Roms, complete package £275 o.n.o. Will split. Tel: Uxbridge (0895) 70448.

● BBC B Issue 7, Solidisk DDFS, 2 MHZ 128k, DSDD 40/80T, Microvitec monitor, professional datarecorder replay tape/disc Rom, £100+ software manuals as new, all excellent condition £450. Tel: 0705 699668.

● Turbo board for Master 128 £60. ADT Rom £15. Master Replay £20. Games books etc. Tel: 0483 579642.

● BBC B Issue 7 OS 1.2 DNFS1.2 Sidewise 16k Ram + Roms. 40 track Cumana drive, Voltmace 14b joystick, digimouse, lightpen, eprom programmer discs and back issue mags £400 o.n.o. Tel: 0272 604074 after 6pm.

● Parallel printer OKI ML182 very little used vgc £165 o.n.o. Tel: 0784 251612 evenings.

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POST TO: Micro User Classifieds, FREEPOST, Macclesfield, Cheshire SK10 4YB.

◀ From Page 123

```
 680 IFPNM?1<>0 GOTO770
 690 PNM?1=RND(5):?PNM=0:PNM?2=RND(4)-1
 700 IF PNM?2=0 Z=RND(55)*16+&7840
 710 IF PNM?2=1 Z=&3A40+RND(25)*640
 720 IF PNM?2=2 Z=RND(55)*16+&3A40
 730 IF PNM?2=3 Z=&3C40+RND(25)*640
 740 PNM?3=Z MOD 256:PNM?4=Z DIV 256
 750 !&70=PNM!3:?&72=&60:?&73=&A
 760 CALLM%
 770 CALLW%
 780 CALLT%
 790 PROCcol
 800 O%=O%-8:IFO%<200 GOTO880:ELSEGCOL0
,0:MOVEO%,1016:DRAWO%,1004
 810 FORO=1TO DELAY:NEXT
 820 GOTO320
 830 DEFPROCcol
 840 C=C+1:IFC>7 C=0
 850 VDU19,12,C;0;19,11,(C+1)MOD8;0;19,
10,(C+2)MOD8;0;19,9,(C+3)MOD8;0;
 860 ENDPROC
 870 REM ***** DEATH *****
 880 FORO=1TO500:NEXT:FORO=100TO0STEP-1
0:SOUND3,3,0,2:NEXT:FORO=1TO1000:NEXT
 890 LIVES=LIVES-1
 900 IFLIVES<0 PROChiscore:GOTO80
 910 COLOUR3:PRINTTAB(15,1);LIVES;
 920 FORO=1TO2000:GOTO100
 930 :
 940 DEFPROCdp(O,CHAR)
 950 ?O=RND(16)*16:O?1=RND(&30)+&40
 960 ?&70=?O:?&71=O?1:?&72=CHAR:?&73=&A
 970 CALLM%:CALLH%
 980 IF ?&75<>0 CALLM%:GOTO950
 990 ENDPROC
1000 DEFPROCair
1010 GCOL0,6
1020 AIR=-8
1030 REPEAT:AIR=AIR+8:FORI=0TO32STEP8:S
OUND&11,-10,(AIR+O%)/8+I,2:NEXT
1040 MOVEAIR+O%,1016:DRAWAIR+O%,1004
1050 UNTIL AIR>500 OR AIR+O%>=1268
1060 O%=O%+AIR+8
1070 ENDPROC
1080 DEFPROCacid(N)
```

This is one of hundreds of programs available FREE for downloading on

MicroLink

In addition to these many BBC Micro programs in the MicroLink library will also run on the Electron.

```
1090 FORO=1TON:A=RND(800)+200:B=RND(700
)+100
1100 F=&3E
1110 S=RND(3)
1120 FORP=-45 TO 45 STEP (S*4)
1130 ?&359=F:MOVE-120/S+A+((P^2)/20)/S,
B+P/S
1140 DRAW120/S+A-((P^2)/20)/S,B+P/S
1150 F=F EOR 3:NEXT:NEXT:ENDPROC
1160 DEFPROCcave
1170 COLOUR15
1180 PRINTTAB(0,2);STRING$(20,CHR$247);
CHR$243;
1190 FORO=3TO30:PRINTTAB(0,O)CHR$244;TA
B(19,O)CHR$245;:NEXT
1200 PRINTTAB(0,31);STRING$(19,CHR$246)
;
1210 GCOL0,15:VDU5:MOVE1220,28:VDU 246,
4
1220 GCOL0,7:FORO=1TOdiff
1230 MOVE O*24,0:DRAWO*24,12:NEXT
1240 ENDPROC
1250 DEFPROCinit
1260 CLS
1270 IF diff<10 DELAY=100-diff*10 ELSE
DELAY=1
1280 C=1:GEM=0:O%=1276
1290 num=&80+(diff DIV 2)*4:wino%=&B00+
diff*4:PAT=&B80+diff*5:PNM=&B80
1300 WX=50:WV=1226:NR=INT(diff/2):NE=di
ff*2
1310 ENDPROC
1320 DEFPROCobjects
1330 GCOL0,3:FORO=1TONE:A=RND(29)*32+64
:B=828-RND(20)*32
1340 VDU5:MOVEA,B:PRINTCHR$248;:NEXT:VD
U4
1350 COLOUR15:VDU5:FORO=1TO NR:A=RND(29
)*32+64:B=828-RND(20)*32
1360 GCOL0,15:MOVEA+64,B:PRINTCHR$249:M
OVEA,B-32:PRINTCHR$250;CHR$251;CHR$252:M
OVEA,B-64:PRINTCHR$253;CHR$254;CHR$255
1370 MOVEA+56,B-96:DRAWA+128,B-96
1380 NEXT:VDU4:ENDPROC
1390 DEFPROCscore(S)
1400 COLOUR7:S$=STR$(S)
```

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```
 1410 PRINTTAB(12-LEN(S$),1);S$;
 1420 ENDPROC
 1430 DEFPROCairbonus
 1440 SOUND3,0,0,1
 1450 FOR0=1TO1000:NEXT
 1460 REPEAT:SOUND&11,-10,0%/8,2
 1470 GCOL0,0:MOVE0%,1016:DRAW0%,1004
 1480 0%=0%-8:S%=S%+diff
 1490 PROCscore(S%)
 1500 UNTIL0%<200
 1510 FOR0=1TO2000:NEXT:ENDPROC
 1520 DEFPROCheadings
 1530 !&70=&0A003440:CALLM%
 1540 !&70=&0A8034A0:CALLM%
 1550 COLOUR5:PRINTTAB(0,0)"0XY";
 1560 COLOUR1:PRINTTAB(0,1)"SCORE:";
 1570 COLOUR7:PRINTTAB(6,1)"000000";:PRO
Cscore(S%)
 1580 COLOUR2:PRINTTAB(18,1)"0";
 1590 COLOUR3:PRINTTAB(15,1);LIVES;
 1600 GCOL0,6:MOVE200,1004:MOVE1268,1004
:PLOT85,200,1016:PLOT85,1268,1016
 1610 GCOL0,7:MOVE192,1000:DRAW1276,1000
:DRAW1276,1020:DRAW192,1020:DRAW192,1000
 1620 ENDPROC
 1630 DEFPROCdemo
 1640 VDU26
 1650 PROCinit:PROCcave:PROCheadings
 1660 VDU28,1,30,18,3
 1670 COLOUR7:PRINTTAB(3,2)"MOON PATROL"
;
 1680 VDU19,14,2;0;:COLOUR14
 1690 FOR0=1TO10:PRINTTAB(0,0+5);"000000
..";score$(0);
 1700 PRINTTAB(6-LEN(STR$(score(0))),0+5
);score(0);:NEXT
 1710 COLOUR10:PRINTTAB(0,26)"Enter leve
l 1 to 9";
 1720 TIME=0:D=1
 1730 VDU19,14,D;0;:D=D+1:IFD>7 D=1
 1740 PROCcol:FOR0=1TO100:NEXT
 1750 A=INKEY(0):IFA>48 AND A<58 diff=A-
48:ENDPROC
 1760 PROCsound
 1770 *FX19
 1780 IF TIME<750 GOTO1730
 1790 CLS
 1800 COLOUR7:PRINTTAB(3,2)"MOON PATROL"
;
 1810 !&70=&0A004440:CALLM%
 1820 !&70=&0A204940:CALLM%
 1830 !&70=&0A404E40:CALLM%
 1840 !&70=&0A605340:CALLM%
 1850 !&70=&0A805840:CALLM%
 1860 !&70=&0AA05D40:CALLM%
 1870 !&70=&0AC06240:CALLM%
 1880 COLOUR3
 1890 RESTORE 1970:FOR0=1TO7:READA$:PRIN
TTAB(5,2*0+3);A$;:NEXT
 1900 COLOUR10:PRINTTAB(0,26)"Enter leve
l 1 to 9";
 1910 TIME=0
 1920 FOR0=1TO100:NEXT:PROCcol
 1930 A=INKEY(0):IFA>48 AND A<58 diff=A-
48:ENDPROC
 1940 PROCsound
 1950 IF TIME<750 GOTO1920
 1960 CLS:GOTO1670
 1970 DATA Spaceman Sid,Fuzz,Winotron,Sc
out Craft,Crystal,Oxygen,Space capsule
 1980 DEFPROCsound
 1990 IFINKEY(-82) THEN *FX210,0
 2000 IFINKEY(-17) THEN *FX210,1
 2010 ENDPROC
 2020 DEFPROChiscore
 2030 *FX200,1
 2040 IF S%<score(10) ENDPROC
 2050 PROCcave:VDU26,28,1,30,18,3,12
 2060 COLOUR3:PRINTTAB(2,1)"YOUR SCORE O
F"
 2070 COLOUR10:PRINTTAB(6,3)"000000";TAB
(12-LEN(STR$(S%)),3);STR$(S%);
 2080 COLOUR3:PRINTTAB(0,5)"QUALIFIES YO
U FOR""" THE HALL OF FAME"
 2090 COLOUR5:PRINT"""""PLEASE ENTER YO
UR"'TAB(7)"NAME:"
 2100 COLOUR132:PRINTTAB(3,20)STRING$(12
," ");
 2110 S$="":X=4:CHAR=60:T=0:*FX15,0
 2120 COLOUR7:PRINTTAB(X,20)"<"
 2130 PROCcol:T=T+1:IFT>7 T=0:CHAR=CHAR
EOR 2:PRINTTAB(X,20)CHR$(CHAR);
 2140 FOR0=1TO100:NEXT
 2150 A=INKEY(0):IFA=-1 GOTO2130
 2160 IFA=127 AND LEN(S$)>0 S$=LEFT$(S$,
LEN(S$)-1):PRINTTAB(X,20)" ";:X=X-1
 2170 IFA=127 GOTO 2130
 2180 IFA=13 GOTO2210
 2190 IFLEN(S$)<10 G$=CHR$(A):S$=S$+G$:P
RINTTAB(X,20)G$;:X=X+1
 2200 GOTO2130
 2210 0=0:REPEAT:0=0+1:UNTIL score(0)<=S
%
 2220 FORI=9TO 0 STEP-1:score(I+1)=score
(I):score$(I+1)=score$(I):NEXT
 2230 score(0)=S%:score$(0)=S$
 2240 COLOUR128:*FX200,0
 2250 ENDPROC
 2260 IF ERR=17 VDU26:GOTO80
 2270 MODE7:REPORT:PRINT" at line";ERL:E
ND
```

Get it right!

```
 10 =    0 0
 20 =    0 0
 30 =    0 0
 40 = A0A9 9
 50 =  C94 4
 60 = 27EC 9
 70 = 8309 E
 80 = 41D7 4
 90 =  A38 A
100 = 8978 D
110 = BA28 8
120 = BFC4 9
130 = 183C D
140 = DD37 6
150 = 8B7C C
160 = 1A3E A
170 =  A95 4
180 = 5942 8
190 = 5883 8
200 = 9F8D 8
210 = F0B2 9
220 = 9153 7
230 = 77DA F
240 = EBE2 3
250 = 2256 B
260 = 49A1 7
270 = CA63 4
280 = 1B01 A
290 = A089 A
300 = 5725 6
310 = 1621 2
320 = 3A5E B
330 = 8056 1
340 = DDF1 4
350 = 3010 F
360 = 614F F
370 = 869D 3
380 = A089 6
390 = 2796 E
400 = B964 F
410 = 395F 9
420 = FEDB 3
430 = E9B4 E
440 = 45B0 5
450 = CF40 0
460 =  74A 5
470 = 5ACD 6
480 = 931B 0
490 = 2C44 2
500 = 470A 5
510 = C093 8
520 = 55F9 7
530 = 394E D
540 = 22A5 8
550 = 4E48 A
560 = C19F 9
570 = D863 A
580 = A3B7 F
590 = F001 3
600 = 3639 D
610 = DFCB 4
620 = D863 A
630 = 2796 4
640 = E85E 6
650 = 6D7C D
660 = 2C83 F
670 = F170 9
680 = 4E6A 3
690 = 4894 2
700 = BBC1 D
710 = 1A44 5
720 = C7EA 2
730 = 3C9D 2
740 = 8ECC F
750 = 5EDA B
760 = D863 5
770 = 34DB 1
780 = 6188 5
790 =  620 E
800 = 4E62 0
810 = 7DF2 D
820 = 68A1 1
830 = 10B8 6
840 = E7B2 8
850 = E2D3 F
860 = ED0F 4
870 =    0 4
880 =   6D 1
890 =  65A F
900 = 67D7 9
910 = 3D5D C
920 = CD38 E
930 = 9719 0
940 = 6578 3
950 = 9952 E
960 = F23D C
970 = 8C2F 6
980 = B424 4
990 = ED0F B
1000 = 2781 4
1010 = 73C8 1
1020 = 4EE2 C
1030 = 978D 1
1040 = F3E1 F
1050 = 820F 9
1060 = 2B78 E
1070 = ED0F 2
1080 = 2362 8
1090 =  268 9
1100 = B543 F
1110 = 3307 5
1120 = 1775 3
1130 = 7E24 4
1140 = 6089 F
1150 = 8457 B
1160 = 618B B
1170 = 43F1 5
1180 = 37CC A
1190 = AC93 7
1200 = 5271 7
1210 = CDD2 C
1220 = CD85 4
1230 = E67D A
1240 = ED0F 7
1250 = 344C 1
1260 = 7A16 A
1270 = 38E7 6
1280 = 3345 D
1290 = E42F 6
1300 = 8908 5
1310 = ED0F 1
1320 = 3091 0
1330 = 6BF6 D
1340 = 2721 7
1350 = 91B7 D
1360 = 8B8B A
1370 = DCB8 4
1380 = C10B 4
1390 = AC25 4
1400 = 97A8 6
1410 = 4106 5
1420 = ED0F F
1430 = 2DBD 4
1440 = 52A2 E
1450 = B8E0 3
1460 =  70D 6
1470 = D3D3 F
1480 = 7287 B
1490 = 1282 9
1500 = BABA C
1510 = A5AE 4
1520 = 7DB6 5
1530 = 22DE 2
1540 = 6E08 7
1550 =  9F9 B
1560 = 734A E
1570 = 78A6 D
1580 = 677C E
1590 = 3D5D C
1600 = AA21 4
1610 = E6BF 6
1620 = ED0F C
1630 = 92A5 7
1640 = B962 1
1650 = CE67 B
1660 = F4EA E
1670 = 90A1 8
1680 = A726 0
1690 = 26D6 E
1700 = B185 F
1710 = A624 E
1720 = 44BA 9
1730 = 4DEC D
1740 = 6276 7
1750 = D7FC A
1760 = 536B 4
1770 = 61AE 7
1780 = F727 E
1790 = 7A16 7
1800 = 90A1 2
1810 = E5C6 E
1820 = D146 2
1830 = 74F3 D
1840 = C8EE 6
1850 = BA35 9
1860 = 96B0 E
1870 = A50B D
1880 = C90B 4
1890 = 1C97 0
1900 = A624 3
1910 = 173E 9
1920 = 1D8E 6
1930 = D7FC C
1940 = 536B 0
1950 = C207 0
1960 = D48A 7
1970 = 8933 F
1980 = F80F 2
1990 = 5FFC B
2000 = 9F19 3
2010 = ED0F C
2020 = CCF8 2
2030 = 2FD3 7
2040 = 9873 C
2050 = FAE8 D
2060 = 719B 9
2070 = 8ACA F
2080 = 12F1 A
2090 = 20BE 0
2100 = 3A94 C
2110 = B2FA 2
2120 = 910E 0
2130 = 1330 6
2140 = 57F5 F
2150 = 2924 E
2160 =  8E7 4
2170 = 5924 D
2180 = 1077 6
2190 = CF8F E
2200 = 9C99 C
2210 = 4898 6
2220 = 4036 3
2230 = 3B2B 5
2240 = D69A 7
2250 = ED0F 7
2260 = C474 1
2270 = 5ACE 2
```

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£10 Prize letter

High speed REMovals

HERE's an automatic REM remover that I'm sure will interest you. It should be typed in using a word processor and saved as Ascii:

```
0A%=PAGE:B%=0:REPEATM%=A%?
(B%+3):IFA%?(B%+4)=&F4:B%=
B%+M%ELSEA%=A%+M%:IFB%>0FO
RC%=A%-M%TOA%STEP4:!C%=C%!
B%:NEXT
1UNTILA%+B%>TOP:END
RUN
0
1
```

Often in the course of programming I crunch a program down to the smallest possible size. I usually have one instruction per line and REM statements on lines by themselves – this is where this routine comes in.

*With the program to be crunched in memory, use *EXEC to merge the REMover, which puts the two lines of code into lines 0 and 1, runs it and, when finished, the two lines are automatically deleted.*

It works by looking at the beginning of each line. So initially it sets A%=PAGE and B%=0.

If line begins with a REM – the token &F4 – it adds the length of that line M%, to the variable B%. If the line is not a REM, it is moved down in memory by a distance B%. Hence REM lines are overwritten by the moving down process. This continues until the end of the program.

The END command also makes Basic sort out its internal variables, including TOP – which has now changed.

One problem is that it does not take account of GOTO and GOSUBs going to a REM line. And it assumes that you have not put a space between the line number and the command. – **David M. Kurtz, Streatley, Berkshire.**

Coded text files

*The following is a short but effective BBC Basic program for encoding and decoding text files. It first *LOADs the file into memory then encodes it and *SAVEs it to another file. The output file may have the same name as the input file and will then overwrite it.*

A repeatable sequence of pseudo-random numbers is EORed with the text characters so the encoded file seems completely random, but repeating this process will recreate the original text.

A key, which is any number from 1 to 2147483647 is used to initialise the random number generator.

The memory used is automatically wiped so no record of the text is left in memory for snoopers to examine. This version is designed to input and output 7 bit characters so it is compatible with electronic mail systems. – **Alan Linton, via MicroLink.**

```
  10 REM SecuriText
  20 MODE7:INPUT"File",F$
  30 F%=OPENIN F$
  40 L%=EXT#F%+4:CLOSE#F%
  50 DIMH%L%:M%=&7F7F7F7F
  60 PROCos("LOAD "+F$+" "
+STR$~H%)
  70 INPUT"Key",K%
  80 CLS:R%=RND(-K%)
  90 FORI%=H%TOH%+L%STEP4
 100 PRINTH%+L%-I%CHR$13;
 110 !I%=!I% EOR (RND AND
M%)
 120 NEXT:INPUT"Save",F$
 130 PROCos("SAVE "+F$+" "
+STR$~H%+"+"+STR$~L%)
 140 FORI%=H%TOH%+L%STEP4
 150 'I%=0:NEXT:END
 160 DEFPROCos(S$)
 170 LOCALX%,Y%:Y%=7
 180 CALL&FFF7:ENDPROC
```

Micros that don't match

BEING an avid reader of The Micro User *I was wondering if you could help clarify a few points concerning the BBC Micro.*

I own a BBC B+, OS 2.0 with a 1770 DFS and previously I owned a model B. I have a lot of software that was suitable for my B but that won't work on my B+. I was informed that the B and B+ were fully compatible but this is not so, as I have realised.

I am told that the problem lies in the operating system and that a suitable piece of software would cure it. Could you let me know if such a program exists?

My next question involves roms. Is there any way of getting my micro to ignore one? I know they can be unplugged on the Master and I am interested in finding if there is such a system for the B+. On the same subject: How can you alter the priority of roms? Is there a simple method, or does it involve altering internal connections? – **Sachin Jadhave, Londonderry, Northern Ireland.**

● Unfortunately you have been misled: The B and B+ are different micros and although there is a high degree of compatibility, there are differences which cause some software – particularly games – to fail. There is no solution apart from buying compatible software.

The Rom Manager from Watford Electronics will allow you to switch roms off but the only way to alter priority is to swap them physically.

Micronet moans

I wonder if any of your readers have tried to join Micronet lately? Recently I made an impulse purchase of a second-hand modem from my local BBC Micro dealer.

The following Friday I telephoned Micronet and asked if they would send me some details. The following Tuesday, nothing had arrived so I

Turn to Page 128 ►

Win a tenner

● **Want to write to The Micro User? The address is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.**

Writers of the most interesting letters receive a £10 prize.

Security conscious

MY friend and I are writing a program and are interested in the security aspect: We want to stop people listing them. Can you help? – **Michael Kennell and David Bignell, Sandy, Beds.**

● The listing in the April 1987 issue of *The Micro User* showed how you could protect discs.

If we explained in detail how you can stop people listing your programs everyone would know how it's done and could reverse it. However, here's a simple method that will stop some people listing your programs.

Enter the new first and last lines and the commands following:

```
0REM********
32767REM*
!(PAGE+5) = &7F7F7F7F
!(PAGE+9) = &15030075
?(TOP-3) =6
```

You'll find your program will no longer list.

◀ From Page 127

gave MicroLink a ring and asked them to send me details. The next morning they arrived – still nothing from Micronet.

On Wednesday night I used the Micronet demonstration screen to request that details be sent to me. The next day I sent off an order to PMS for their new Publisher program. I had telephoned PMS the previous day and was told they were very busy so my order might be delayed.

Friday arrived and still nothing from Micronet. I telephoned them and was told they would put something in the post for me. On the same day I sent off a coupon to the Clydesdale Bank for details of their Telebank service.

Saturday morning's post again contained nothing from Micronet – that morning I posted my application to MicroLink. Monday morning arrived – nothing from Micronet, but a reply from Clydesdale Bank. Do they employ people to open post on Saturday?

The postman had left a note on Tuesday afternoon to say that he had tried to deliver a parcel. It turned out to be my order from PMS – well done. On Wednesday my MicroLink registration arrived.

On Saturday morning, as I write this letter, I still have not heard form Micronet. How is it that MicroLink, Clydesdale Bank and PMS have managed to find their way to the Post Office, but apparently Micronet cannot? I thought the electronic revolution was supposed to speed everything up? – **Peter Savage, Burgess Hill, West Sussex.**

The BBC B in business

AT the moment I am using a BBC B with 2nd processor and Acorn DFS with single sided disc drive. I am very pleased with it and the software that is available for it.

My problem is that I shall be taking on a franchise shop as soon as I can get suitable premises and when that happens I shall be using the BBC B for general accounting purposes. I'll also maintain a database to note every customer's name, address and details of the sale for future use as a mailing list, stock check and for statistics.

After a start-up period – which will enable me to gain some funds in the business – I shall be buying an Archimedes and will want to transfer the data already saved on the BBC Micro.

Could you please supply me with some advice as to which software could fit my situation? – **N.E. Ashton, Rhos-on-Sea, Clwyd.**

● The Contex Bank Manager may well supply some of your needs and is available on both BBC B and Archimedes in compatable form. But a more complete suite of business programs is available from Minerva Systems. This again works on both machines.

Running out of space

I recently sent my BBC B away to have a DFS installed and about a week later it was returned with a QFS 2.00 fitted.

What is a QFS? Errors such as No room are now being generated by my cassette-based programs which were not previously there.

The QFS must be the cause, as they only appeared once it was installed. Please could you tell me if this is so and what I can do about it? It's very frustrating. – **Simon Twining, Hewaswater, Cornwall.**

● All disc filing systems – including the very obscure QFS – use some main memory as workspace and cause the problem you describe. You can type:

```
*TAPE
PAGE=&E00
```

before running your tape-based programs.

First Word solution

IN the June issue of The Micro User you published a letter from Bernard Melling of Blackpool who has a problem with a form feed at the beginning of each print run using First Word on the Archimedes. I also had this problem and, as good quality paper is quite expensive, a solution had to be found.

I am using a Citizen 120D and the nearest driver supplied with my version of First Word was for the Epson LX80. However there was this unwelcome form feed each time I printed something out. The solution I use is this:

Load up First Word and then load Epson LX80 Hex as a file to be edited. Near the end of it there is a command – Vertical initialisation – which carries a value of 20. If you put an asterisk before the beginning of this line it has the effect of rendering this command inoperative. so the initial form feed is removed.

This line will now look something like this:

```
*20 Vertical intialisation*
```

I don't know if this has any adverse effects on the rest of the program – say when multi-page documents are being printed – but it certainly works for short letters or reports. – **John Savage, Newry, Co. Down.**

Can't see the wood...

AS an optician rather than a computer expert, I was surprised to see you didn't tell Nicholas Longfield in the August issue that all he has to do to prevent his printer outputting on one line is enter:

```
*FX6
```

You must be looking for a more difficult solution. – **A. Reeder, Watford.**

● Yes, you're right, we didn't see that one. We'll have to visit you for a check-up.

Quality counts

IN your June edition I saw an advertisement placed by Contex Computing for its Bank Manager program. In it was a reference to your review of April 1986. I have all issues of The Micro User and on looking back and reading the review I was quite impressed so I ordered a copy.

Since receipt of the program I can only say that I become more and more impressed as time goes by. The package arrived very promptly – what a pleasant change from 28 day delivery I have come to expect from some companies – and was neatly presented.

The manual is clear, precise and logically laid out.

The program is a delight, catering for use at many levels from simple home banking to complex multi-account management.

My own use sits somewhere on the complex side of middle at present, but even with complicated inheritances on the horizon this program still has more than enough headroom for the future.

Every section works well with much on-sceen information and prompting, but not to the extent of becoming tiresome when you know what you are doing.

Having said that, the recovery program rescued me today when I pressed Break by mistake and left the data files open.

You hear so much nowadays about products that fail to live up to vendors' claims that I thought I ought to redress the balance slightly and praise a product unreservedly.

Very well done Contex. – **Christopher M. Barnes, Staines, Middx.**

£10 Prize letter

More on the Beast

I have typed in the program Beastiroids from the June 1988 issue of The Micro User. *If the following amendments are made, disc users can save the high score table to disc:*

■ *Create an initial high-score file named* be *using:*

```
  10 B%=OPENOUT"be"
  20 FORT%=9TO1STEP-1
  30 READ N$:S%=200*T%
  40 PRINT#B%,N$,S%:NEXT
  50 CLOSE#B%:END
  60 DATA Barty (Author),
Roger Dodger,Tiny Tim,Meta
l Marvin,Viking Rangers,Ch
eshire Champ,Barmy Boris,S
lartibartfast,Zanny Zaphod
```

■ *Load Beastiroids and delete lines 140, 220, 240 and 280.*

■ *Delete *TAPE I M in line 50 to allow disc access and change both &E00s into &1300s.*

■ *Change line 130 to read the high score from disc:*

```
  130 x=OPENIN"be":FORT%=1
TO9:INPUT#x,N$(T%),SC%(T%)
:NEXT:CLOSE#x
```

■ *Change line 230:*

```
230 COLOUR2
```

■ *Add to line 270 code to save the high scores to disc each time the table is updated:*

```
  270 IFsc%=-1PRINTTAB(10,
26)"Enter your name":VDU31
,2,4+N%*2:A%=0:X%=&A7:Y%=&
2A:CALL&FFF1:N$(N%)=$&700:
x=OPENOUT"be":FORT%=1TO9:P
RINT#x,N$(T%),SC%(T%):NEXT
:CLOSE#x:GOTO150
```

I hope these modifications will interest fellow readers – **Patrick de Backer, Belgium.**

Misleading manual

I have an issue 4 BBC B, OS 1.20 with Basic II. I want to direct program output to the printer without it being displayed on the screen, but the methods given in the user guide don't work.

*According to page 422 the command *FX3,2 should direct output to the printer only. When I include this in my program nothing appears on the screen – as expected – but nothing comes out on the printer either.*

I have tried VDU21 to disable the VDU drivers. With this I do get output on the printer and not on the screen, but printer codes sent from the program to select different type styles are corrupted and it only functions properly if everything is in plain print.

I suspect this is a question of an alteration in the later issue OS not reflected in the user manual. Or is it possibly due to having discs present? Can you enlighten me as to how to accomplish the desired effect? – **I.D. Hunnable, Woodford Green, Essex.**

● Unfortunately the manual is wrong: The correct command is *FX3,10. The full description of *x* in the command *FX3,x is given by the table:

Bit	Effect if set	Value
0	Enables RS423 driver	1
1	Disables VDU driver	2
2	Disables printer driver	4
3	Enables printer Independently of Control+B and Control+C.	8
4	Disables spooled output	16
5	Not used	
6	Disables printer apart from VDU1,n.	64
7	Not used	

To use this, decide what options you need – bits 1 and 3 set for printer only – so *x* becomes 2+8 = 10.

Anagrams revisited

WITH regard to Hans van Maanen's delightful program – Library, June 1988 – the routine can be made doubly elegant by suppressing duplicated permutations arising from repeated characters in the input string.

The key point is that if the input string is in ascending alphanumeric order all duplications can be identified – as they are less than or equal to the last permutation printed. The following changes assume the initial condition holds:

```
 45 last$=""
 90 IF K%=N% last$=$B%:PRI
NT$B%:ENDPROC
130 IF $B%>last$ PROCperm(
$B%,K%+1,N%)
```

If you prefer to sort the input string internally amend line 50 to read:

```
50 PROCperm(FNsort(W$),1,L
ENW$)
```

and incorporate a suitable routine: As it is used once only a simple bubble sort should suffice. – **Andrew M. Simpson, Craigie, Perth.**

Tripped up by OSCLI

I have typed in Chinese Chess from the May issue of The Micro User *and I'm sure the listings are correct. Listing I works, but when it CHAINs the second program I get* Bad program. *Can you please help? –* **P.A. Fuller, Winnersh, Wokingham, Berks.**

● It would seem you have Basic I in your micro and unfortunately an OSCLI slipped through in Listing II – line 1810. It can be replaced with PROCoscli if you add these lines:

```
2000 END
2010 DEFPROCoscli($&700)
2020 LOCAL X%,Y%
2030 X%=0:Y%=7
2040 CALL &FFF7
2050 ENDPROC
```

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we can no longer answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.

Cutting down text files

CAN you please tell me how to split long text files stored on disc – such as instructions on telesoftware – into smaller files that can be edited and printed from Wordwise Plus? – **A.S. Day, Fetcham, Leatherhead, Surrey.**

● First you must find out how long the file is. If it is called *text* you do this by entering:

```
*INFO text
```

The result will be something like:

```
$.text FFFFFFF FFFFFFF 00473B 057
```

The third number is the length in hexadecimal – see Mike's Micro Memos in the July issue for an explanation of hexadecimal – and the following method for splitting files will work providing that it is less than &6300. You need to know half the length of the file so enter:

```
P.~&473B/2
```

This gives &239D. Next you load the file at, say, &1900 using:

```
*LOAD text 1900
```

You need to find where the second half of the file starts and this is done by adding half the length – &239D – to &1900 using:

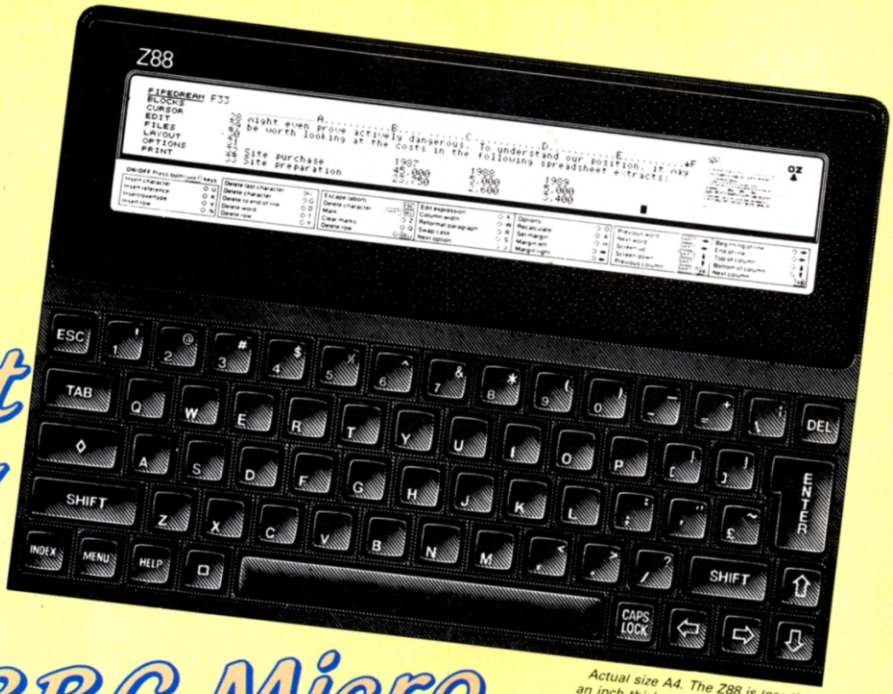
```
P.~ &1900 + &239D
```

which gives &3C9D.

Now you can save the file in two halves with the commands:

```
*SAVE text1 1900 +239D
*SAVE text2 3C9D +239D
```

It's the latest — and the most exciting add-on for the BBC Micro



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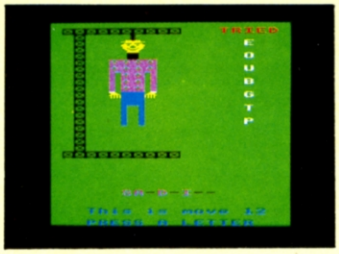

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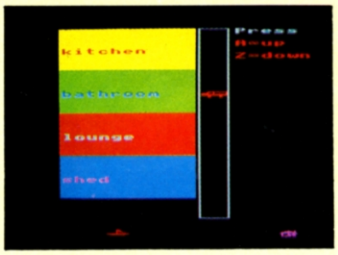

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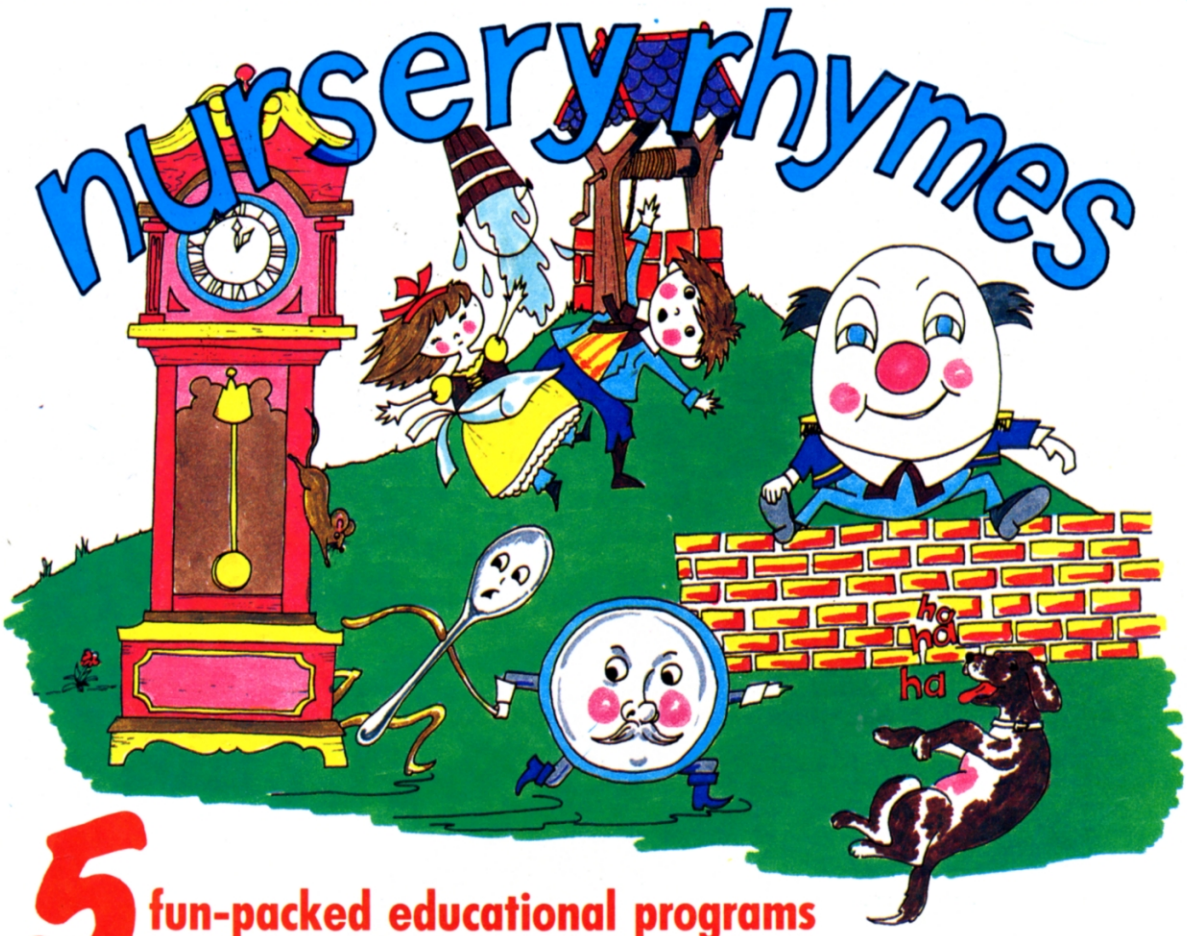

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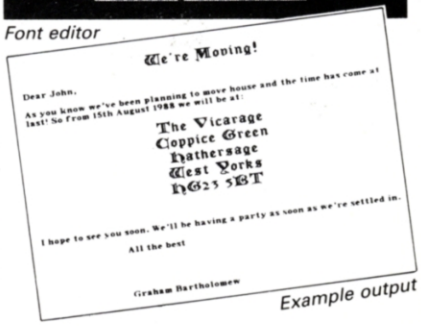
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Ten of the Best *(see page 132)*

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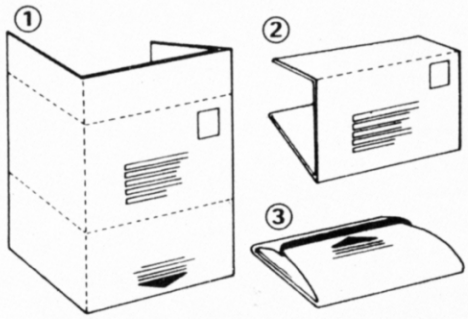

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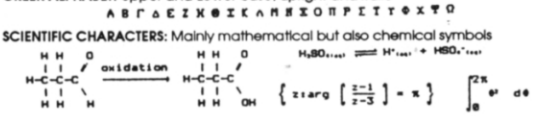

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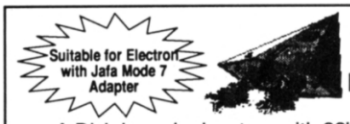

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